

The ADB water operational plan 2011-2020 recommended the adoption of country water assessments (CWAs) to allow a better understanding of water issues at country-level. This resulted from growing international concerns about water security, coupled to the water-food-energy nexus. The CWA will enable the formulation of a national water policy as part of a framework for improved water governance. From such an analysis, a national program of action can be designed, with 10 and 20 year horizons, underpinned by a set of proposals aimed at effective water resources management. To complement this, an ADB program of funding and technical support will be proposed, for a 10-year horizon.

Viet Nam faces a very difficult and complex water future. It reached the status of "lower-middleincome country" in 2009, and strong economic growth has provided a sharply declining poverty rate. However, the strong economic growth, internal migration, urbanization, and industrialization are all combining to increase pressure on water resources and for the provision of services such as water supply, sanitation and flood protection. Despite perceptions, Viet Nam is not rich in water and already some river basins are below the dry season adequate water level. Conflicts over access to water, surface and groundwater, are a real and growing issue. Water pollution is also a major issue in most river basins, with terrible pollution levels in some water sources, significantly reducing the utility of that water. This adds to the water security risks. In addition, climate change will progressively require the need to adapt to sea level rise, salt water intrusion, and changes in precipitation and temperature. The net result is a growing threat to future water security over much of the country, and rapidly increasing levels of pollution and degradation of water sources.

This paper describes a CWA and its uses, and sets out the contents of the draft CWA for Viet Nam. It also sets out the main findings so far.

Keywords

Country water assessment, Viet Nam, water security, water-food-energy nexus.

Introduction

This paper presents the concept of a Country Water Assessment (CWA), a new approach for ADB water management, using current work for the Viet Nam CWA to indicate benefits, issues and results so far. Some of the main Viet Nam CWA findings are discussed.

Concerns about water security are now increasingly mainstream. The 2030 Water Resources Group of the World Economic Forum Water Initiative found the following:¹:

- 1. Water scarcity will increase dramatically in many parts of the world, with significant social and economic repercussions. Global grain harvests will be threatened, more countries will rely on food imports, and the livelihoods of many people will be threatened. This is on top of the billion or so people who currently do not have access to improved water supply.
- 2. Meanwhile, global demand for food, especially meat, will rise sharply, placing more pressure on water for agriculture. Unless we change how we manage agricultural water, we will not be able to provide the food for tomorrow's consumer demands.

¹ WEFWI, 2009. World Economic Forum Water Initiative. 2009. The Bubble Is Close to Bursting: A Forecast of the Main Economic and Geopolitical Water Issues Likely to Arise in the World During the Next Two Decades

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3. At the same time, and compounding the problem, fast-growing economies, especially in the Middle East and Asia, will likely allocate less water to agriculture over the next 2 decades and more to the growing demands of their urban, energy, and industrial sectors.

This reflects growing concerns about the significant threats to water availability both at a global level and crucially, at regional levels, particularly in parts of Asia and the Pacific. Economic growth in the region will soon be constrained by water shortages, affecting the production of food and energy. This is crystallized in the concepts of the water-food-energy nexus, short-hand for the links between the sustainable provision of water, food, and energy. The established links between water and human health have been well articulated and remain a compelling focus.

For the ADB, the challenge is how to respond to the rapidly emerging risks and pressures. In developing a future approach to water, we need to understand: (i) why past water policies and strategies have not been effectual in the face of growing shortages, and thereby allowed a crisis to develop; and (ii) how to maximize the impact of ADB's water interventions (agriculture, urban, energy, and natural resources) to help address the risks through better governance.² The critical role for ADB is to encourage its developing member countries (DMCs) to respond proactively and constructively to the prospects of water insecurity by adopting new ways of managing water, introducing good water governance, and recognizing the irreplaceable value of a limited resource. In other words—starting to think differently about water.

The ADB water operational plan 2011-2020 recommended the adoption of CWAs to allow a better understanding of water issues at country-level and to inform its clients and its programs as to the most timely and effective interventions. The strategic objective of the CWAs is to provide a fact-base on present and forecast water demand and supply, together with detailed and quantified measures that are designed to deal with future water security. The supply /demand fact-base will enable the formulation of a comprehensive and pragmatic national water policy as part of a framework for improved water governance. This will focus on identifying measures for more efficient and effective water use at a significant scale, which so far has hardly had a place in strategic thinking.

Ultimately, the CWAs will provide a vision of how national water sustainability may be achieved or maintained for the future, balancing the competing needs for water, food and energy security. Using planning horizons of 10 and 20 years, and based on an outline of what a new national water policy should contain, a national program of action will be proposed. Consistent with this, a 10-year ADB program of funding and technical support will also be proposed.

The CWA concept is being trialed in a number of countries: Bangladesh, Kyrgyz, Tajikistan, Uzbekistan, and Viet Nam. For 2014, the Indonesia CWA is planned, and two more countries in Central Asia, mostly likely Azerbaijan and Turkmenistan, and possibly two in the Pacific.

A Template has been prepared for CWAs covering the sections set out in Table 1. The Viet Nam draft as at January 2013 had covered Chapters I to V, with some initial work on Section VI.

Key Issues and Challenges

Issues in the CWA process

² In the Viet Nam CWA governance is generally taken to cover the legal and policy framework, monitoring, planning, institutional arrangements and performance, regulatory frameworks, economic viability and private sector participation

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Given its stated role, the CWA must be a fact-based analysis. Although this must be based on currently available material - no new research or studies are to be undertaken - it must be comprehensive in both scope and detail, covering the full range of potential water governance areas. In this context, a key issue for the Viet Nam CWA is the vast amount of available water-related material that needs analysis and updating, and the size of the resultant CWA document. Viet Nam has benefitted from an ADB sponsored Water Sector Review (WSR) in 2008/9

Chapter	Content
I. Introduction & Background	Purpose, context
II. National Setting	Geography, history, population, economy, socio political setting
III. Water availability	Current status/overview, water data, rainfall, river systems, water hazards, outlook
IV. Water use and demands	Water footprint, demand/use for all economic sectors
V. Managing water	Water governance, administrative structure, policies, legal & regulatory framework, awareness, development
VI. Future Scenarios	Growth/trends, managing supply and demand, governance, private sector
VII. Program component	Options for water security, Government program, ADB program

Table 1: Outline of CWA

(including a status report, an issues and options report and a Final Report) and there are also available recent master planning other assessment and documents for the major economic sectors. As well, the Ministry of Planning and Investment regularly updates a range of economic, social and other data, including the Living Standards Household Survey (the most recent is 2010), that provide extremely useful information for water resources management. The result is a vast array of data and information to analyze and the compilation of this into a draft document that is already around 200 pages.

Another key issue is how to get meaningful buy-in from the Government side to ensure that this is not just an ADB activity. This is essential, but is also complex and difficult. So far in

Viet Nam, there has only been preliminary discussions with counterparts in the Ministry of Natural Resources and Environment (MoNRE), the main water management Ministry. Although the CWA must have a strong IWRM focus, as Viet Nam is in transition from a water development phase to a water management phase, it must also span areas managed by many other Ministries. These include the various economic development sectors, the social related interests such as health, and the environment related interests such as river health and forestry.

The template sets out sections of the CWA covering water footprints (to determine the water footprint for the country, including internal and external footprints), and analysis of the virtual water situation (provide estimates on the transfer of virtual or embedded water internally and internationally through the trade of major commodities). Undertaking these analyses requires considerable information that is not available for Viet Nam.

Issues in the Viet Nam CWA³

Water Resources

³ Full referencing of the content of this section is provided in the draft CWA for Viet Nam

One of the major issues in Viet Nam is its future water security. International water dependence is one side of the water security risk. The Red River, the Dong Nai River and the Cuu Long (Mekong Delta) together account for 75% of Viet Nam's surface water. However, almost 95% of Cuu Long surface water originates in the upper Mekong countries, nearly 40% of Red River water originates in China, and 17% of Dong Nai water comes from Cambodia. As well, 30% of the Ma River basin water, and 22% of the Ca River basin water come from Lao PDR.

Another side of the water security risk is that Viet Nam has only limited water resources to support its population and economic development. By international standards and the average yearly national water volume, Viet Nam appears bountiful in water. But this presents a very false picture of Viet Nam's water security. Viet Nam is characterized by a long dry season: 7 months in the north, 7-9 months in the center and 6 months in the south. Water available during

the dry season amounts to only between 20–30% of the total annual volume.

At current levels of population, over the dry season 10 of Viet Nam's 16 river basins are experiencing water availability stress, being below the adequate water level and likely to experience irregular or local dry season water shortages. Two basins are at or below the water shortage level - see Figure 1⁴.

As expected, the water exploitation situation is critical during the dry season, when only 5 basins are considered not stressed. classified 6 are 'moderately stressed', and 5 are classified being 'highly as stressed' – see Figure 2.5Clearly the high levels of water extraction compared to the available water for the Ma and SERC are not sustainable.

The WSR projected the situation up to 2020, as shown in Figure 3. This presents a dire picture for some basins. The Dong Nai



Figure 1: Per capita water availability in the dry season season water volumes and current devleopment



Figure 2: Water exploitation stress for the dry season

and the SERC would be in the red zone (a state of constant water shortages) and 10 other basins (including the Red River) would be below the adequate water level (in the green zone). In terms of water exploitation stress, the SERC would be above the 100% line (the diagonal red

⁴ Note that the SERC is not strictly a river basin but represents a very dry area of Viet Nam covering a number of very poor provinces to the east of the Dong Nai River basin

⁵ Under criteria used by the OECD and European Environment Agency, moderate stress begins when 20% of the available water is begin extracted, and high water stress occurs above 40%.

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line), meaning that the projected water use would well exceed the total water available during the dry season. Many basins including the Red and Dong Nai, would be in the high stress zone. The other basins would be in the moderate stress zone, with only two not stressed.

At the same time, terrible water pollution many areas is significantly reducing the utility of local water sources adding to water security risks. There is no comprehensive picture of water quality in Viet Nam. While there is little data to demonstrate the extent of pollution and its impacts



Figure 3: Water availability and use - at 2020 based on the dry season water volume

on people's lives and their water use, there are increasing media reports citing examples of terrible pollution, lack of meaningful measures by local authorities to curb pollution and increasing community concerns. Water pollution and degradation of water resources are increasingly major issues for the Vietnamese people, as is evidenced by the recent outcry and subsequent successful court cases against a major polluter near Ho Chi Minh City (HCMC).

Other main water resources issues are:

- Lack of data and information is one of the major impediments to IWRM decision-making. There is no comprehensive inventory and assessment of water resources. Responsibilities are dispersed and overlapping. There is no integrated storage and reporting system and water resources data and information are not readily shared. The current observation network was designed for the construction and development phase and is not suitable for IWRM responses.
- Groundwater is a much used but poorly understood resource: there is no comprehensive picture of occurrence or availability in Viet Nam. In areas of concentrated extraction (around Hanoi, HCMC and the Central Highlands) water levels are dropping dramatically – a further threat to long term water security. Groundwater in the Red River Delta (including parts of Hanoi) is seriously polluted with arsenic, covering an area of over 2,500 km².
- Viet Nam is prone to many different types of natural hazards; more than 70% of the population is exposed to such major hazards. From 1990-2009 Viet Nam suffered an estimated annual economic loss equivalent to 1.3% of GDP or USD3.85billion. This will worsen under climate change predictions.
- Despite a strong legal framework, water licensing is not having an impact on water resources management. Of existing organizations/individuals that should legally be licensed to exploit water (surface or groundwater), or to discharge wastewater, only a small percentage (possibly below 10%) are licensed. Rights to water are not defined, making business investment decisions inefficient and the application of measures to protect legal rights difficult. As well, very limited explicit policy on water regulation and allocation has been developed. Water is not explicitly shared out, it is just taken, and the water sharing decisions that are made are only focused on resolving current conflicts.
- Viet Nam has one of the largest dam systems in the world, comprising over 750 medium and large dams and thousands of small dams. However, there is no national dam safety

program or an overall strategy for the safe management of dams, independent of the dam owners.

- Water and water services are currently well underpriced, and the pricing policy is varied for different income groups. The current pricing policy results in inefficient use by those who have had access to free or cheap water. It has also led to a dearth of financial resources where the sectors have not been self-financing but have lived on subsidies. Pollution charges are not effective as a deterrent.
- State water management capacity is currently very limited; the WSR concluded that major changes in the knowledge and skills of water resource managers and operators at all levels was required. New skill sets for Government staff for IWRM will be required; many of these are new to Viet Nam and have not been undertaken before, and will require specific training, development and support. The situation in the provinces is perhaps even more critical, with few staff resources and very limited capacity; yet this is where much of the implementation of the new Law must take place.

Agriculture and irrigation

90% of the poor and 68% of the population live in rural areas. 70% of employment is in agriculture and agricultural production generates 21% of National GDP. In many places agriculture activity is becoming increasingly part-time and integrated with non-farm activities.

About 80% of the crop area planted is for paddy rice. Between 2000 and 2010 the area under rice decreased by 2% but national production increased by 23%. Viet Nam's rice yields have been increasing at a greater rate than most other countries; in the decade to 2010, the Viet Nam yield increased by 40% compared to 15% in Australia and 13% in China.

Irrigation is currently managed by area, not by water volume, and there is little information about water diversions from rivers and water use on farms. However, estimates of irrigation withdrawals show that water use is dominated by irrigation - as much as 90% of total water use in some river basins, with the national average at 82%. But this use in not efficient or effective: in most basins, agriculture consumes between 70-90% of the water and between 50-70% of the employment, but only contributes between 25-45% of the GDP.

There are 110 Irrigation and Drainage Management Companies (IDMCs) carrying out O&M activities of agricultural water control systems. Generally, State-run IDMCs operate the headworks and main canals; province-run IDMCs manage the primary and secondary canals and works, and Water User Organizations manage other works to get water to the farm. The Government has promulgated many policies and a number of participatory irrigation management (PIM) models have been developed. But PIM is still not well advanced. An irrigation benchmarking scheme is being developed with World Bank assistance.

Concern that the "user-pays" model of irrigation O&M, and the difficulty in collecting irrigation service fees, led the government to fully subsidize O&M costs of irrigation infrastructure above the tertiary canal level from 2008.

Urban water services

The urban population is projected to be 64 million in 2049, representing nearly 60% of the total (currently 32%). Over half of urban people currently live in the South East Region and the Red River Delta, creating separate and dominant core-periphery urban systems (HCMC and Hanoi).

In 2009, although nearly 83% of the urban population was served with piped water supply, only 59% had a house connection. Coverage by the water supply companies averages from 70% of

the urban population in the large urban areas, to 10%-15% in the small urban areas. ⁶ Over 200 out of approximately 650 district towns do not have piped supply.

Service provision by the 68 companies averages 23 hours a day, providing 100 lpcd, which is less than the national target of 120-150 lpcd. Only 22% of companies met the target. The average non-revenue water for all companies is 30%. The 2009 revenues recover operational cost and debts; however, input costs continually rise while the water tariff is only adjusted every five years.

In 2009 more than 67% of households in urban areas had access to a toilet, with much higher rates in the main cities, but only 60% in smaller cities. Over 4 million m³/day of urban wastewater was produced in 2009, but only 6 cities had wastewater treatment plants installed with a total treatment capacity of less than 380,000 m³/day. The rest is discharged to the environment without treatment or captured in septic tanks, which are not well maintained.

Rural water supply and sanitation

The rural population is 60.7 million. At 2010, 80% of rural people had access to clean water, but only 40% use water that meets the national standard. This means that over 36 million rural people do not have access to health-standard water. Only 10.5% of rural households have access to tap water.

Around 11.4 million rural households (77% of the total) had access to latrines in 2009. However, only 33% had latrines meeting the health standard, meaning that around 40 million rural people do not have access to health standard sanitation. Nationally, 23% of rural households do not have latrines. Only about 15% of the rural population regularly wash their hands with soap, and less than 5% of schools have soap available; public sanitary facilities are not well maintained.

<u>Industry</u>

Viet Nam is experiencing a fundamental economic structural shift towards industry. At the same time, industrial activities are being increasingly concentrated in the Red and Dong Nai river basins.

Industry makes up around 41% of GDP. Industrial water use is generally only a few percent of the total water use in a river basin, with only 2 or 3 exceptions. Nearly half of the total water use for industry is in the Red River basin and 25% in the Dong Nai. Economic returns for industrial water use are relatively high compared to other uses. However, they are low compared to other countries indicating that the level of industrial technology in Viet Nam is out dated.

Despite strong laws, most industrial sites do not implement wastewater collection and treatment and wastewater exceeds the national standards for most parameters. In 2009, around 1,000,000 m³ per day of wastewater was being released into the environment by 171 industrial zones, with only 30% being treated. The industries involved with fertilizers and nitrogen compounds, pulp, paper and paperboard, and other basic chemicals compounds are the top 3 most significant contributors to water pollution. At province level, Ho Chi Minh City (HCMC) and Hanoi stand out as having the highest overall ranking on the National Pollution Index; HCMC scores highest on all four indexes (water, air, land, total).

The main Ministries own and operate many of the major industrial companies as State Owned Enterprises (SOEs), and many of these are amongst the largest polluters. Re-structuring the SOEs is slow, mainly observed in enterprises with small capital. The equitisation process stalled during the world financial crisis, but has seen a revival from 2010.

⁶ Towns in Class 3 and higher are generally served by water supply systems that are managed by dedicated water supply companies

Charges to limit environmental pollution and to create a funding source for the Environmental Protection Fund are not being uniformly applied and not all provinces participate. The major issue in regulating pollution is the lack of resources and capacity to implement the laws and policies of the government.

Craft village based industries are a recent phenomena, particularly in the Red River basin. Traditional craft villages are where skilled craftsmen group. But the nature of craft villages has changed recently and rapidly. Today, of the total 2,017 craft villages, 228 are traditional villages and rest are mini-industrial areas, involving 1.4 million households, employing 11 million people.

<u>Hydropower</u>

In 2010, hydropower provided 38% of the total power. The national power development plan projects that by 2030 the medium growth in electricity consumption will be around 5.5 times the current. By 2020, power sources will diversify to include pumped storage hydropower, renewable energy and nuclear power, all of these increasing in significance. Hydropower is not expected to increase beyond 2020 when all the major schemes will be built.

The hydropower generation capacity is expected to increase from 9,412 MW in 2010 to 20,306 MW at 2020, including small hydropower and pumped storage plants. Most increases are projected for the Red River basin, which will increase capacity more than four fold. Viet Nam has relatively small hydropower potential compared to other countries and has taken steps to obtain hydropower from neighboring countries.

Current dam operating rules are designed to maximize electricity generation with little consideration of downstream river health or community needs. Hydropower dams are rarely designed to provide downstream releases; very few have outlet valves to provide water releases. As a result there are growing conflicts over access to water in many river basins, and increasing energy security is proving a real threat to water security. Recognizing some of these conflicts, the government directed MoNRE to issue regulations on maintaining minimum flows downstream of reservoirs. MoNRE has issued water licenses for some hydropower plants; however, the license application is made too late in the process, after most of the decisions about design and operation have been made.

Aquaculture

The area of aquaculture increased by 60% between 2000 and 2011, to 1 million ha; 70% is for sea/brackish water (mostly for shrimp) and 30% freshwater. In 2000, aquaculture made up about 20% of the total fisheries production; by 2011 this had increased to about 54% - and is accelerating. About 73% of the fisheries production takes place in the Mekong Delta, with a further 14% in the Red River Delta. Since 1995, the export earnings from aquatic products have been approximately doubling every 5 years. Water resource impacts are that freshwater aquaculture requires a regular supply of good quality water, which can often compete with other uses and users; and all aquaculture can have serious environmental consequences for water source health.

Navigation

Navigation in Viet Nam is significant. Of the 41,000 km of natural waterways, 8,000 km are used commercially. In 2004, transport of cargo on inland waterways accounted for almost 20% of the total cargo transported. In 2006, passengers took about 179 million trips over some 3,600 million km on inland waterways, representing about 13% of total passenger transport. Inland waterway transport services are provided by SOEs operating under two state corporations attached to the Ministry of Transport. Private operators have expanded their market share significantly in recent years. Water resource impacts are the dependence on specific river levels

at critical river reaches, which can often compete with other uses; and navigation facilities (large boats, ports) can have environmental consequences for water source health.

Opportunities

Opportunities for the CWA process

As indicated above, the current CWA are trials or pilots of what is a new activity for the ADB and the DMCs. As such, experiences gained and lessons learnt through these processes can be used to fine tune the process. The CWA Template recognizes this, welcoming feedback to the CWA working group.

The work to prepare the Viet Nam CWA has shown that it takes considerable effort to prepare a draft document, and that when it spans all of the water related sectors and their governance, a very substantial document is the result. This will make it difficult for senior ADB and Government staff to digest the wide range of issues and the proposed reform programs. Consultation and genuine buy-in from both sides would be difficult under the process originally envisaged.

Therefore for Viet Nam, a 2-stage approach has been proposed to ensure buy-in and ownership by both sides. Stage 1, is a comprehensive situation analysis building on the water sector review for Viet Nam and also incorporating demand analysis and projections, by sub-sector and where possible by river basin or region. This stage is being completed through desktop analysis with little or no involvement by Government water managers. The outputs will be a comprehensive status report and a summary document that will be used for consultation with Government and other international development partners (IDPs). These Stage 1 reports are expected to be completed in April/May. Stage 2 will involve extensive consultations with Government to formulate an agreed set of priorities and an investment program to address these. This will take time and resources for workshops and together developing the agreed governance reform program. Consultation with other IDPs will also take place in this stage.

Opportunities for the Viet Nam CWA

The sample of the issues identified in the CWA for water resources management and sector water use and development presented in this paper, are many and extremely varied. The challenge for the CWA Stage 2 is to prioritize these and meld them into a program of governance reform backed by investment programs. Fortunately in Viet Nam there are a number of opportunities for the ADB to interact with the Government on more effective water-related management across all related sub-sectors.

Firstly, a new Law on Water Resources was approved in 2012 and the Government is now beginning its implementation. This is a wide-ranging Law with a strong IWRM focus and will have implications for all sectors. It has chapters covering data and information, water resources planning, water source protection, water exploitation and use (including water use efficiency), protection against natural hazards, financial measures and international cooperation. As many of the measures proposed in the Law are completely new to Viet Nam, the Government is seeking international support to assist with implementation.

A second opportunity lies with the current preparation of the National Action Plan for Enhancing the Efficiency and Effectiveness of Integrated Management, Protection and Use of Water Resources (the NAP), currently begin prepared by MoNRE. This is seeking to ensure "the integrated, sustainable, and effective management, exploitation, use and protection of water resources with a view to maintaining water security and thereby contributing to sustainable development, environmental protection, social security and national defense, and resilience to the impacts of climate change and sea level rise and depletion of water resource". In the current draft, a program of activities is being proposed structured around 5 specific objectives:

- Source Consolidating the system of legal documents to facilitate the implementation of the LWR.
- Assessing sources of water, and demand and use of water resources, and establishing systems to measure and assess all water resources.
- Responding to changes of water resources under the impact of climate change / sea level rise, and water use in upstream countries.
- Regulations for effective/efficient use of water; and actions to prevent and mitigate water degradation.
- Improving capacity for water resources management at all levels, and increasing awareness inducing changes in actions to protect water resources.

This could form one basis for the structure of the CWA investment program related to water resources management. While the NAP will be focused on MoNRE's responsibilities for water resources management, and the implementation of the Law, this will impact across all Ministries and water users.

However, there will also need to be investment programs for the sectors to ensure efficient water use, and efficient and effective service delivery. For example, achieving more efficient water use in agriculture, extending rural water supply and sanitation, provision of water and





sanitation particularly to the smaller urban areas, minimizing industrial pollution, minimizing the impacts of hydropower plants (social and environmental) and the protection of inland waterway opportunities. In this regard, another opportunity is to build on the activities identified in the WSR. This identified 5 output areas under which the major recommendations and proposals were grouped - see Figure 4. This grouping covered water resources management as well as sector recommendations and proposals.

Conclusions

Preparation of the Viet Nam CWA has demonstrated the usefulness of the concept. The main benefit is to provide a comprehensive and detailed fact base on current and future water security, particular as it aligns with the water-food-energy nexus, and what role the various sectors play in this. It allows a focus on the governance of the overall water sector - for water resources management in particular, and for sector development and use. It provides a platform around which a governance reform program can be negotiated with Government.

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