

# Pilot introducing the river basin management approach in Sittaung River Basin/Myanmar

Ingrid Nesheim, Zaw Lwin Tun, Toe Aung, Hla Oo Nwe

River basin management, Integrated Water Resources Management (IWRM), Water Framework Directive, Myanmar

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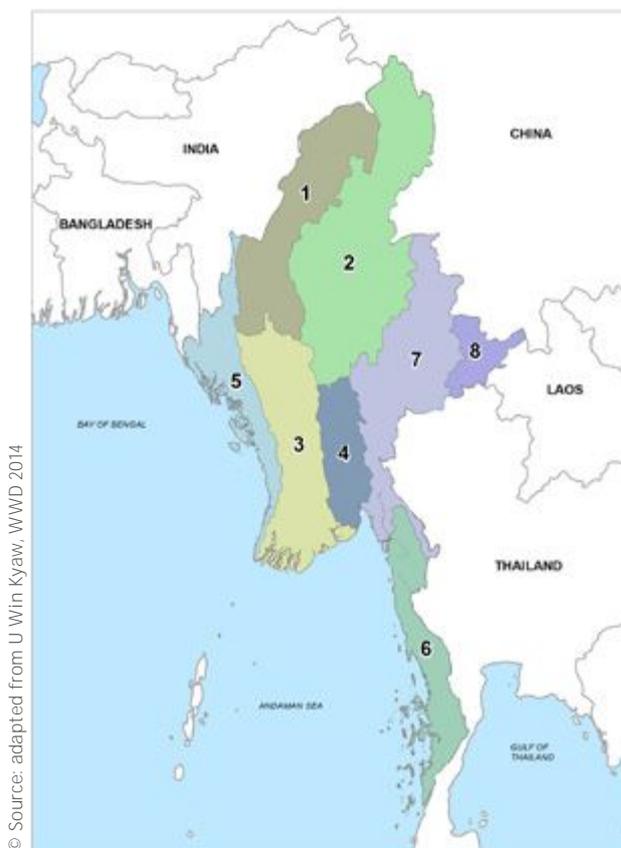
*An important aim of the IWRM Institutional Building and Training project is to pilot test the river basin management approach in Myanmar. The purpose is to investigate how cooperation between different sectors on river basin level, including stakeholder participation can be implemented in Myanmar. The Sittaung River Basin is selected as the case study area as it is a relatively small river basin, and as there are few, if any, ethnic conflicts in the basin. The practical water management tasks are implemented in Bago sub-basin of the Sittaung River Basin Area (RBA). The paper first describes the administrative governance system in Myanmar as this is an important baseline for introducing the river basin management (RBM) approach. The testing approach is then presented, also including practical water management tasks. Implementing the RBM approach involves organising coordination platforms for developing a River Basin Management Plan; a River Basin Area Committee, and a Non-Governmental Stakeholder Group. A pragmatic solution oriented approach in a small sub-basin can permit experiences that provide for valuable insight related to the overall aim of holistic and sustainable water management. In the paper challenges related to implementing the River Basin Management Approach in Myanmar are discussed.*

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## Introduction

The river basin management approach refers to coordinated water management within the entire basin including the accompanying wetland, the marine influence area and ground waters; across administrative borders such as states, regions, town and municipalities. The approach reflects the first principle of the Dublin Statement on Water and Sustainable Development [1], which is considered to represent the core of the Integrated Water Resources Management (IWRM) concept. The rationale of the approach is that all components within a catchment area are linked through the hydrological cycle and hence all parts of a water system need to be understood in relation to one another. The approach of using basins to set management boundaries and the need to integrate the management of ground water with surface water are furthermore considered part of modern water legislation [2]. The concept can be found in several international IWRM frameworks, such as the UNESCO guidelines [3], Network of Asian River Basin Organizations (NARBO) of the Asian Development Bank [4] and of the EU Water Framework Directive [5].

Myanmar has embraced the concept by adopting two policies, the National Water Framework Directive (NWFD) and the National Water Policy (NWP). The NWFD resembles the EU WFD by including seven principles which parallel the principles of the EU WFD, among these, river basin management approach, coordination, and the aim of good ecological status. An important difference, however, is that the NWFD is not a law, it is a policy framework which still awaits specification of an operational framework. Although the river basin management approach is widely supported internationally, it has also been criticised, and there have been challenges of implementation in many countries [5, 6]. Challenges experienced typically refer to low effectiveness of river basin agencies/committees due to unclear roles of mandate or committee responsibility, and also difficulties of fit and compatibility between the newly created river basins committees and the national and regional administrative institutions [7, 8]. In fact, it has been argued that implementation of the "river basin management approach" has been more successful where a more



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**Figure 1:** A rough illustration of the eight river basin areas commonly depicted in Myanmar;

- |                                   |                           |
|-----------------------------------|---------------------------|
| (1) Chindwin River Basin,         | (5) Rakhine State,        |
| (2) Upper Ayeyarwady River Basin, | (6) Taninthari Division,  |
| (3) Lower Ayeyarwady River Basin, | (7) Thanlwin River Basin, |
| (4) Sittaung River Basin,         | (8) Mekong River Basin    |

pragmatic approach delineating sub-basins has been practiced; that is, sub-basins that consider relevant historic and current administrative boundaries [8, 9].

### Study area, the Sittaung River Basin

The Sittaung River (**Figure 1**, No. 4) lies in east-central Myanmar, rising in Mandalay Region on the edge of the Shan Plateau and flowing south for 420 km before it runs out into the Gulf of Martaban of the Andaman Sea. The total length of the Sittaung River from upstream to the outlet is 420 km and the catchment area is 48100 km<sup>2</sup>. There are 23 major tributaries to the Sittaung River, and it is linked to the Bago River by a 61 km long canal built in 1878. The canal was renovated in 2014 to regulate flooding and to provide irrigation water for 70,000 people in 28 villages. In the catchment, most of the annual rainfall, which often falls in short rainfall events with high precipitation, is distributed within six to seven months of the year. Average rainfall in the far north is 889 mm while in the south rainfall ranges from 2,540 mm to 3,810

mm. Average temperatures vary between 24–29 degrees Celsius. Thus, the difference between the wet and dry season is minimal [10] leading to low relative evaporation [11]. The majority of the population lives in rural areas, but cities are expanding. In the northern part of the basin, a few small-scale gold mining activities may pollute the river, and illegal logging degrades the forests. The agricultural sector plays a major role in the basin, and the typical agricultural practice has been a single crop during the rainy season without irrigation. Climate and soil conditions are, however, favourable for growing a second and even third crop with irrigation [12]. In the eastern part of the Bago Region and in Yangon Region in the southern and lower reaches of the delta, lands are subjected to flood, formation of swamps and salinity problems.

The Sittaung River Basin is one of the most developed areas in Myanmar. The total population in the river basin is about 5.8 million, which is about 10% of the population in Myanmar. The basin is the smallest among the Myanmar basins, yet with regard to hydrological boundaries the basin covers parts of six regions and states in the country. The Bago Region with the Bago and Taungoo districts covers most of the basin, but also Mon, Kayah, Kayin (Karen), and Shan States and the Nay Pyi Taw Union Territory have territory within the basin.

### Administrative governance in Myanmar

To implement the river basin management approach, it is important to know the administrative set up in a country. In Myanmar, there are seven states and seven regions, and one Union Territory containing the capital Nay Pyi Taw and surrounding townships<sup>1</sup>. The states cover areas with large ethnic minority populations and are located along Myanmar's borders, while regions encompass areas where the majority is Myanmar. The next lower administrative level is the district, and each district consists of several townships. Within townships, there are village tracts (urban areas)/village wards (rural areas) which refer to several villages grouped together. A village is the smallest formal administrative unit.

With reference to governance, since the election in 2016 the President and the State Counsellor, Htin Kyaw and Aung San Suu Kyi respectively, represent the top level of government. Below these positions is the Cabinet of Myanmar, which includes all Union level Ministers. There are currently 21 Ministries, each with several departments<sup>2</sup>. Nine of the 21 Ministries,

<sup>1</sup> These administrative units are named in the 2008 constitution where it is stated that states and regions are constitutionally equivalent.

<sup>2</sup> Before the change of government in 2016, there were 36 Ministries.

including agriculture and irrigation, health, education and mining sectors, commonly have departments on the regional/state level, and also some have departments on the district and township level. The decentralised offices report to the next higher administrative level from where they also receive instructions. The Union Ministries are responsible for mapping overall national policies, while the different state and regional departments are responsible for contextualising, operationalising and specifying what the national policy means at the regional level. The lowest level of government offices can be found on township level. The General Administrative Department (GAD) of the Ministry of Home Affairs supports coordination and communication among the Union government's 21 Ministries, the region and state Hluttaws (parliaments) and also connects the capital Nay Pyi Taw to approximately 166,799 village wards and village tracts in the country [13]. In addition to the Union Government department's offices on the region/state level, there is a state/region government which consists of: 1) a partially elected Hluttaw (parliament), 2) a Chief Minister and a cabinet of state/region ministers, and 3) state/region judicial institutions. Serving as the country's legislature is a national level Hluttaw (parliament) and regional state/region Hluttaws (the Pyithu Hluttaw).

In urban areas, a Township/City Development Committee is responsible for water, sewage, trash collection as well as urban road maintenance and urban electricity. It also has an important role in collecting certain taxes, issuing business operating licenses and construction permits. Village level governance is performed by the elected village tract administrator/village ward administrator. Within the village, there is a further level of coordination known as the household heads' system whereby groups of 10 households select representatives to participate in village tract forums. Several formal and informal committees have been established for coordination at the township level, yet horizontal co-ordination between departments remains a challenge [14]. The overall situation is strongly hierarchical and compartmentalised, meaning that each department is focusing on its own mandate to achieve its national priorities [15, 14].

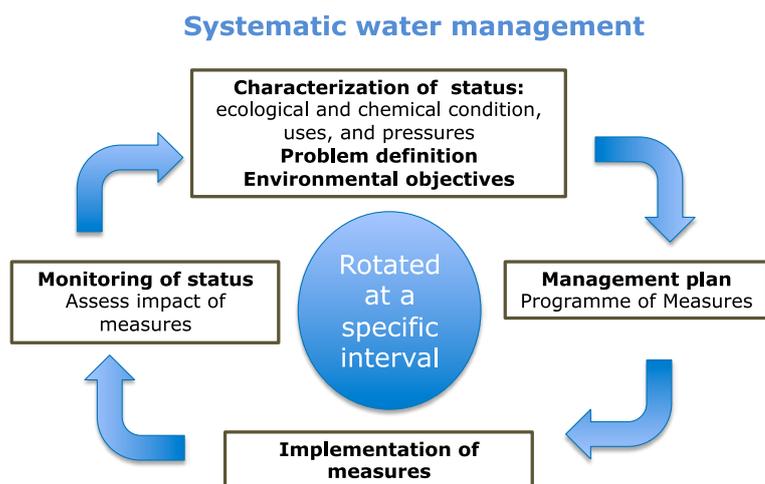
### Delineation of the Sittaung River Basin Area, pilot exercise

According to the river basin management approach, an administrative River Basin Area (RBA) should comprise the whole catchment. This means that the catchment should not be split in two or more RBAs, but be kept as a complete unit. It should comprise all areas that can affect the main stem of the river, i.e. all the areas that drain to the river. As a river basin enters the sea as "a tip" at the outlet, there will be small



**Figure 2:** Sittaung River Basin Area presenting the suggested Sub-Basin Areas, and the different administrative states and regions

triangles between the river basins that are not covered. These areas have to be split and shared with neighbouring RBAs in the most suitable and appropriate way. All terrestrial, limnic and coastal areas will therefore be assigned to RBAs and hence be included in the water management system. It is for practical reasons relevant to specify a sub-basin unit to ensure that local perspectives are considered and to facilitate for coordination of practical work tasks. The sub-basin unit commonly includes the main river and its tributaries, but it often also considers relevant administrative borders. Regarding delineation of sub-basin areas, political administrative borders may to a greater extent be considered [5], as the overall River Basin Management Plan is decided on the River Basin Area level. The work on Sub-basin Area level is important for local anchoring and coordination. The whole River Basin Area needs to be covered by Sub-basin units [15].



**Figure 3:** Systematic water management reflecting the different steps of the EU Water Framework Directive

As a collaboration by the Forest Department, Ministry of Natural Resources and Environmental Conservation (MONREC), the Irrigation Department, Ministry of Agriculture, Livestock and Irrigation (MOALI), Directorate of Water Resources and Improvement of River Systems, Ministry of Transport and Communications (MOTC) and the Norwegian Institute for Water Research (NIVA), two project workshops were organised in Bago March and September 2015 to discuss delineation of an administrative Sittaung River Basin Area, and delineation of Sub-basin Areas within the basin. Around 50–60 people attended the workshops. The attendants were mainly representatives from three focal ministry departments in the Bago Region; Forest Department (FD), Irrigation and Water Utilization Management Department (IWUMD), Directorate of Water Resources and Improvement of River Systems (DWIR), but also from other departments such as Health Department, Environmental Conservation Department, Department of Meteorology and Hydrology, and the Department of Geography. The workshops each lasted one day and were organised at the Irrigation Technology Center (ITC) in Bago Region.

At each workshop, information about the approach was presented, and group work was facilitated for. Furthermore, the different institutions working with water related issues presented information about water quality monitoring, approaches, and results. As a basis and a requirement of the discussion, a map presenting the hydrological boundaries of the basin was made available. Before group work, the participants were divided into five groups to discuss delineation of the Sittaung River Basin Area. After discussing for about an hour, each group presented 'their' delineation of the Sittaung River Basin Area and also argued for their alternative. As part of the group discussions, each group drew their suggested Sittaung

River Basin Area, and the suggested sub-basins on a topographic political map sized 1m x 1,7m. Arguments were presented for the array of different perspectives.

After the workshops, bilateral meetings with important Bago departments including IWUMD, DWIR, DMH, GAD, FD, ECD were undertaken to discuss the different alternatives presented at the workshops. This allowed for an iterative approach on the issue of delineation an administrative Sittaung River Basin Area, over a period of about 1.5 years, from 2015 through the first half of 2016, to gain feedback and to allow the concept to mature. The pilot testing of the approach was also presented regularly to the National Water Resources Committee Advisory Group, an institution which is the highest national authority on water issues in Myanmar.

The first round of discussions resulted in four delineated administrative Sittaung River Basin Area versions. Two alternatives were largely based on the hydrological alternative, while sceptics of an administrative unit based on hydrological boundaries argued for leaving out small parts of the river basin referring mainly to areas within Shan State. These 'sceptics' argued that areas with high conflict level would be difficult to integrate, and that authorities in areas of similar land and water use typically discuss and agree more easily, as their development objectives are similar. Among the hydrological alternatives identified, one alternative strictly referred to the hydrological boundaries, while the other hydrological alternative, referred to as a hydrological-political alternative, considered hydrological boundaries, and in addition the Bago-Sittaung canal combining the Sittaung River with the Bago River (**Figure 2**). Due to this situation, the two rivers are not strictly of different hydrological river basins; the Bago River can be seen as a 'tributary' of the Sittaung River, as water from the Sittaung runs into the Bago River. Activities upstream in the Sittaung may therefore have impact on the situation downstream in the Bago River. This alternative also considers the political unity within the Bago District. With reference to overall decision-making and coordination; it can be seen as beneficial to avoid splitting the district in two RBAs. Ultimately, people favoured the hydrological-political boundary version. The proposed Sub-basin Areas, which largely reflect current political administrative borders and less hydrological issues, include (i) Upper Sittaung River Basin Area (mostly Nay Pyi Taw Union Territory), (ii) Middle Sittaung RBA (mainly Taungoo District), Lower Sittaung RBA (mainly Bago District).

The Lower Sittaung River Basin Area includes the Bago District and the townships of Bago, Kawa, Thanatpin, Waw, DaikU, Nyaung Lay Bin, and Shwe Gyin Township in Bago District, and in Mon State the Kyaik Hto and Bilin Townships within the Thaton District. Practical

**Table 1:** Pressures in case study townships

Bago Township	Thanatpin Ts	Kawa Ts	Waw Ts
Sewage	Salt water intrusion	Salt water intrusion	Salt water intrusion
Garbage	Invasive shell species destroying the paddy fields	Invasive shell species destroying the paddy fields	Invasive shell species destroying the paddy fields
Sand mining	High concentration of phosphorus and nitrogen	High concentration of phosphorus and nitrogen	High concentration of phosphorus and nitrogen
Industrial waste	Ground water pollution	River Bank Erosion and Sedimentation	River Bank Erosion and Sedimentation
River Bank Erosion and Sedimentation	River Bank Erosion and Sedimentation		

water management tasks and related/affiliated administrative issues were tested in the Bago River sub-basin.

### The Bago Sub-basin Area coordination arenas: practically testing the approach

For each River Basin Area, there is a need for a coordinating arena, a forum where management decisions, such as environmental and development aims, and programmes of measures are discussed and where the River Basin Management Plan (RBMP) is decided upon. Development of a RBMP based on systematic water management steps (**Figure 3**) can be seen as a main tool for implementing the river basin approach within an administrative River Basin Area. The River Basin Management Plan is a document describing the work of developing the plan, including the final programme of measures. Development of River Basin Management Plans have not previously been practiced in Myanmar, but such plans are now declared a specific objective in the NWFDP (Principle 5) [16].

As part of the pilot testing of the RBA approach, practical water management tasks and coordination of sector and environmental authorities and involvement of Non-governmental Stakeholders were also undertaken as part of the IWRM project in the Bago Sub-basin<sup>3</sup>. The Bago Sub-basin mostly refers to the administrative Bago District, and hence the level of complexity with regard to decision-making was reduced to that of facilitating the coordination of authorities and non-governmental stakeholders within a coherent small unit. Reflecting the approach of the EU WFD, two arenas for discussion of water management issues were organised in the Bago Sub-basin; the Bago Sub-basin Area Committee, and the Bago Non-governmental Stakeholder Group. Members of a RBA Committee should embrace all relevant sec-

tor and environmental authorities within the (political) administrative units of the River Basin Area. All authorities that may affect water conditions by their decision, or whom could be affected by the decisions of the committee should have the possibility to take part in the discussion.

The common practice for managing committees in Myanmar is to have one institution serving as the Secretary and another institution serving as the Chairperson. The 'Secretary' has the responsibility of inviting people to meetings, preparing agendas, and ensuring that the timeline is followed, while coordinating the decision-making is typically specified to the Chairperson. In the Committee of this pilot, the Bago MONREC Minister was elected as chairperson and the directors of the three main water related departments – the FD, the IWUMD, and the DWIR – were elected as secretaries of this Sub-basin Committee.

The first decision-making issue was deciding upon which main problems identified by the Committee and the NGS Group are prioritised as water management issues. **Table 1** presents prioritised water management issues as identified for four selected townships within the Bago District.

To provide a knowledge base for decision making, sampling for water quality analysis was undertaken monthly by a team consisting of staff from FD and IWUMD, sampling in 24 locations along the Bago River. Analysis of the chemical, the biological and the hydro-morphological water quality elements were undertaken at the IWUMD lab in Yangon and at NIVA. Furthermore, characterisation of water usage and water users and a simplified pressure impact analysis was undertaken in the sub-basin. The pressure analysis shows that there are few industrial activities in the sub-basin, and that the main water users are farmers irrigating their fields in the summer season. There is a hydropower dam upstream, which in the dry summer season may compromise usage of irrigation water.

<sup>3</sup> The Bago Sub-basin is a sub-basin within the Lower Sittaung River Basin Area.

Runoff from sewage and from agricultural areas is a significant pressure in the Bago City area and downstream of Bago City. Water quality analyses also show that the ecological status of water in these areas is poor and that abatement measures are needed.

An important part of a River Basin Management Plan is the abatement measures selected to reduce pressures and to reach environmental aims. The Committee and the Group are currently in the process of prioritising abatement measures to be implemented. A challenge however is the lack of funds and resources for implementing measures. Consequently, an important aim is to identify low cost, yet efficient measures. A measure emphasised in all meetings as central for achieving environmental goals, is increased awareness on all levels of governance and also among civil society.

### Remarks on challenges of implementing the approach

The choice of selecting a small sub-basin (the Bago sub-basin) that largely aligns with the administrative boundaries of the Bago District for pilot testing the RBM approach, can be described as a pragmatic solution-oriented approach. Pilot testing in a relatively small sub-basin where all departments are affiliated to either the same administrative unit, that is, the Bago District, reduced the complexity of involving departments/institutions from different districts within other regions/states. This allowed for a focus on coordinating authorities and stakeholders with regard to systematic water management for the development of a Bago Sub-basin Management Plan. It has been argued that in complex settings such as that of different institutional levels, implementation of IWRM depends more on institutional interplay than on institutional fit [17], [8]. For river basin management to be effective, coordinating mechanisms capable of bridging the gaps between the relevant institutions and organisations are needed.

A central point of experience being gained through this pilot refers to whether, the steps of systematic water management, transparency of water quality and quantity data facilitating for common grounds of understanding across sectors and disciplines, are mechanism which enable successful coordination among actors in Myanmar. A common knowledge base is supported in the project by open access to a water quality database promoting transparency, a principle often violated due to lack of access to information. Facilitating for common understanding is evidently important for the initiating discussions on environmental aims and abatement measures. By testing the approach in a small sub-basin where the hydrological boundaries largely follow the administrative boundaries, the testing of a "spatial fit" that is the fit

between river basin committee and the regional administrative institutions has been downplayed in favour of a focus on the coordination of actors. Yet, the idea of thinking in hydrological terms, i.e. the hydrological interdependencies between upstream and downstream effects, water quality and water quantity, and water and adjacent land-use resources, has been an important frame for all discussions within the Bago Sub-basin Committee and the Non-governmental Stakeholder Groups. It can be anticipated that this perspective has allowed a process of social learning for holistic water management by actors. The continuation of the project towards development of the Bago Sub-basin Management Plan and the subsequent implementation of measures will complete the objective of testing the River Basin Management Approach. The important aim of this IWRM project for implementing the RBM approach is to contribute to local experiences for holistic water management in Myanmar.

### Authors

#### Dr. Ingrid Nesheim

(Corresponding author)

Norwegian Institute for Water Research - NIVA  
Gaustadalléen 21  
0349 OSLO, Norway

#### Dr. Zaw Lwin Tun

Director Design Branch  
Irrigation and Water Utilization Management  
Department  
Ministry of Agriculture, Livestock and Irrigation

#### Dr. Toe Aung

Assistant Director  
Watershed Management Division/Mangrove Division  
Forest Department  
Ministry of Natural Resources and Environmental Conservation, Myanmar

#### Mrs Hla Oo Nwe

Deputy Director Design Branch  
Irrigation and Water Utilization Management  
Department  
Ministry of Agriculture, Livestock and Irrigation

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