



Special Envoy of the Secretary-General for  
Disaster Risk Reduction and Water



Ministry of Infrastructure and the  
Environment



## High Level Round Table on Water Security and the Sustainable Development Goals

### Background Paper

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Inya Lake Hotel, Yangon, Myanmar

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## FOREWORD

*The Global Water Partnership (GWP) Steering Committee meets twice a year, either in Sweden where it holds its Secretariat or in one of the countries where GWP has an active Regional or Country Water Partnership. The Steering Committee meetings are moments when GWP organizes when possible a National or International event to promote a key issue around its main corporate vision, a water secure world.*

*Within the context of the recent Agreement that the International Community has formulated around Sustainable Development Goals (SDGs), GWP at the invitation of the Government of Myanmar, is organizing a High Level Round Table around the theme of Water Security and the SDGs that aims to benefit both Myanmar and the South East Asian Region.*

*This High Level Round Table is designed to be a milestone in the new democracy of Myanmar, accelerating the already consolidated Integrated Water Resources Management, Disaster Risk Reduction and WASH activities ongoing under the guidance of the Government of Myanmar and the World Bank.*

*The event seeks to identify possible challenges to address the inherited impacts from past governments on the water sector with a gender perspective. It may contribute to the reforms which the new government led by the Nobel Peace Prize Winner, Lady Aung San Suu Kyi, who, at present undertaking the duties of the State Counsellor and the Minister of Foreign Affairs, would like to carry out.*

*The meeting is expected to benefit from the experience and strategic vision of several key Regional Organizations with which GWP collaborates in Asia and that have knowledge on water security and SDGs, as well as selected invitees inside Myanmar who play important roles in Myanmar water sector.*

*GWP wishes to thank the Organizations that have co-hosted and sponsored this event, in particular the Ministry of Transport and Communications, the Republic of the Union of Myanmar, the Office of the UN Secretary General Special Envoy for Disaster Reduction and Water, the High Level Expert Panel on Water and Disasters, the Ministry of Land, Infrastructure and Transport of Japan, the United Nations Department of Economic and Social Affairs (UNDESA), Myanmar Water Think Tank, the Australian Water Partnership, Australian DFAT (Aus Aid), the Ministry of Infrastructure and Environment of the Kingdom of the Netherlands.*

*As Chair of GWP, I also wish to thank each and every one of the participants that has come to this event which aims at building a more water secure environment for the people of Myanmar and of the South East Asian Region.*

***Drs. Alice Bouman – Dentener***  
***Chair A.I. of the Global Water Partnership***

# 1. THE 2030 SUSTAINABLE DEVELOPMENT AGENDA <sup>1</sup>

## 1.1 A framework for development cooperation

In September 2015 United Nations member States adopted a landmark agreement on a new global sustainable agenda entitled: “Transforming our World, the 2030 Agenda for Sustainable Development”. This milestone provides a vision and a global framework for national strategies and policies that would eventually lead to the transformation on the road to 2030.

The first 16 Goals of the new agenda define the expected substantive outcomes in different areas of sustainable development across social, economic and environmental dimensions, and the key issues of peaceful societies and effective institutions. Each of these 16 goals includes two types of targets: the outcome type and the “means of implementation” type of targets.

The last goal, Goal 17, is fully dedicated to the means of implementation and revitalized Global partnership for sustainable development. It covers such issues as finance, technology, capacity-building, trade, systemic issues, including policy and institutional coherence, multi-stakeholder partnership and data and monitoring.

The 2030 Agenda for Sustainable Development – together with the Addis Ababa Action Agenda, the Paris Agreement on Climate Change and the Sendai Framework for Disaster Risk Reduction, provides a renewed framework for development cooperation.

Moreover, SDGs were designed to reflect some of the synergies and links between different goal areas with a “nexus perspective” and an integrating approach to promoting all the dimensions of sustainable development. Within this context, the United Nations Department for Economic and Social Affairs (UNDESA) has been developing sustainable development tools to provide governments and stakeholders with insights into key interlinkages and dynamics of nexi: not only looking at how goals can be delivered in an integrated manner which is vital for policy and decision making based on evidence and best knowledge, but also vital for integrated assessment.

As no size fits all, the exercise takes into account countries’ special circumstances: economic structures, different institutions...etc. While not prescriptive, it looks at integrated assessment of resources (i.e. food security, water management and sustainable energy supply) and how these might be impacted by climate change.

## 1.2 Translating global goals into national goals

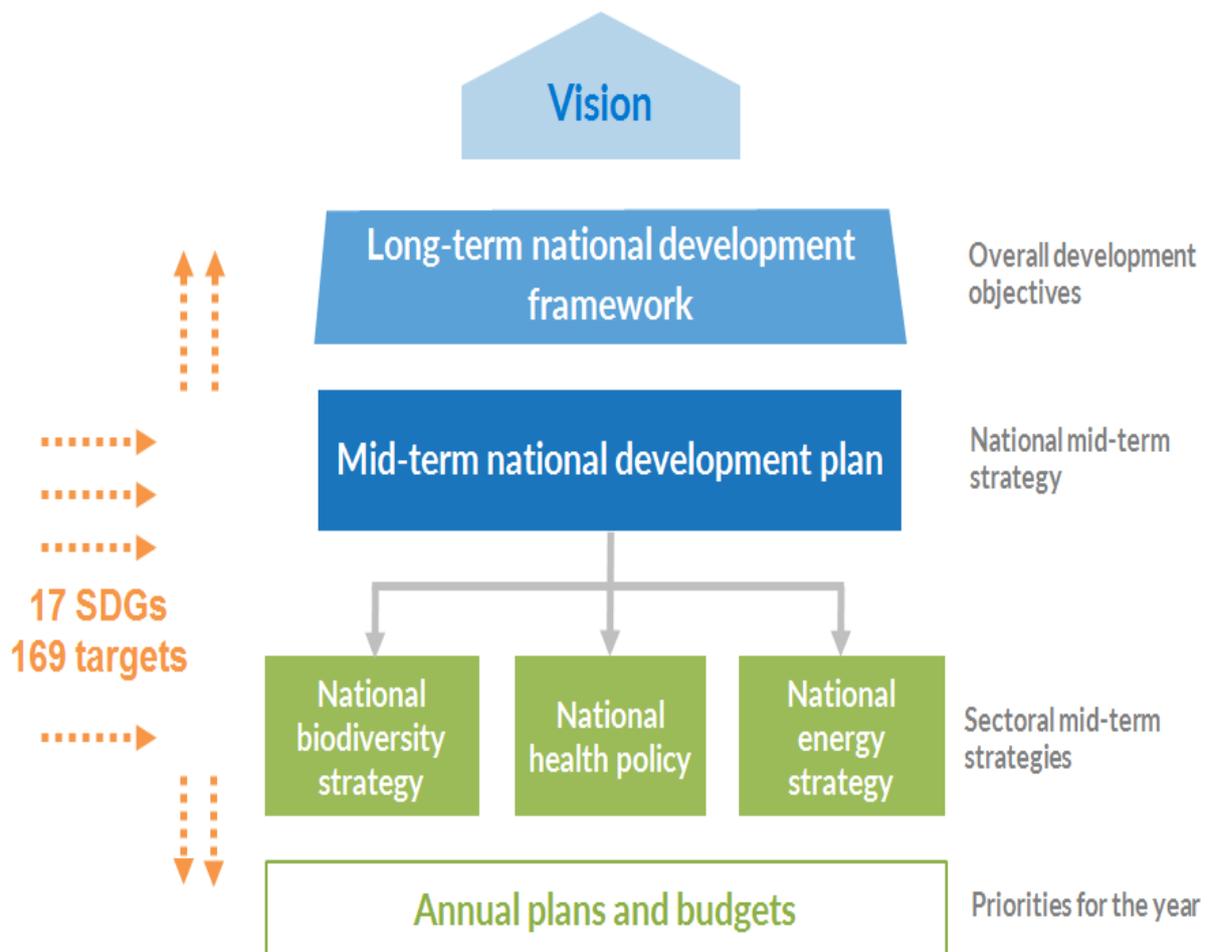
Global goals are important for several reasons. They transform declarations into actions, provide focus to global and national development strategies, enhance partnership for implementation, keep development in the spotlight, raise awareness, promote action

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<sup>1</sup> by Kenza Kaouakib-Robinson, Division for Sustainable development, UN Department of Economic and Social Affairs

through review, and provide direction to global and national development strategies. These goals, however, need to be translated into national goals, if they are to be operationalized at the country level.

First, global goals set the ambition for and measure global rate of progress, which cannot be identical across all the countries. Second, as already mentioned, a one-size approach cannot fit the different needs of different countries as they don't have the same priorities, initial conditions, levels of development, capacities and resources. The SDGs and related targets will require the review of the existing national development plans and strategies, and the discussion of how they can be integrated into these frameworks.



Each government will decide on its national process of integration of the SDGs into national plans and strategies and its own entry point.

### 1.3 Water as an entry point

Many Governments adopted water resources management as their entry point for SDGs' integration. The Agenda 2030 has water at its core, with a dedicated Goal 6 on water and

clear linkages to Goals relating to climate Change, resiliency to disasters and ecosystems, as well as gender among others.

## SPECIFIC MENTION OF WATER IN CURRENT SDGs AND TARGETS



It is common knowledge that water security is greatly impacted by climate change and extreme weather events. Within this context, Agenda 2030 should propel a change of mind-set from all actors, to see more deeply the interlinkages between sectors and overcome the silos that impede more coherent and integrated policy. Within this context, effective water resources management should adopt a risk-informed approach.

The Sendai Framework for Disaster Risk Reduction 2015-2030 outlines the association between El Niño and the occurrence of weather and climate extremes, including droughts, heavy rains and floods. Extreme weather can have profound implications for people's lives, health and livelihoods –flooding and intense rainfall have been associated with large outbreaks of water-borne diseases (such as cholera) and vector-borne disease outbreaks.

According to the World Meteorological Organization (WMO), the 2015-16 El Niño is one of the strongest on record, being comparable with the 1997/98 and 1982/83 events. The 1997/98 El Niño led to loss of lives, destroyed infrastructure, depleted food and water reserves, displaced communities and resulted in disease outbreaks. Estimates of its global impact ranged from US\$32 billion to US\$96 billion.

While the environmental, humanitarian and physical impacts of El Niño can be immediately evident, data on the economic effects is sparse and its impact on global markets underappreciated. As the 2015/16 El Niño is set to be one of the strongest on record, a better understanding of its direct economic and social impact and on water security is essential to build back better and mitigate the impacts of El Niño in the future.

Understanding the socio-economic impact of El Niño is therefore vital to curtail direct disaster economic loss, to reduce the number of people affected by disasters, particularly women. It is imperative to strengthen governance to manage risk and show the role of coordination within and across sectors. Defined responsibilities and cooperation can ensure sustainable results by understanding El Niño conditions. These should be effectively communicated to local communities including women who are engaged and supported, to reduce risks and respond appropriately.

#### 1.4 Stakeholder's engagement and partnership

The 2030 Agenda places people at the center of sustainable development efforts, and emphasizes the importance of localizing the SDGs and leaving no one behind.

Engaging key national "change agents", such as government officers, including from sectoral ministries, parliamentarians, local authorities, media representatives, business and industry, community leaders, NGOs including women, NGOs in the process of reflection on the key steps needed to start the integration of the agenda into the national strategies and plans is a pre-condition for implementing sustainable development nationally.

Effective engagement of local actors in decision-making processes and in the definition of local priorities is also vital and will contribute to greater ownership, commitment and, as a result, more effective implementation of the 2030 agenda. Moreover, the success of development cooperation in support of the 2030 Agenda will be mostly measured in the impact it has on people's lives at the grass-roots level.

In this sense, the role of citizens is also essential to measure results and to influence decisions about the future direction of development cooperation. It is equally vital to engage with the private sector and align its incentives with sustainable development needs, strengthen science, technological development, innovation and build capacity for sustainable development.

## 2.5 Engaging women is vital

Governments must be reminded that women play a vital role as agents of development and that realization of gender equality is crucial to progress across all SDGs and targets. Without that realization women and girls will continue to be denied the full realization of their human rights and equal opportunities.

Regarding Goal 6, the Commission on the Status of Women (CSW 60) recognized that women and girls are disproportionately affected by inadequate water and sanitation facilities, and urged governments “to improve water management and wastewater treatment with the active participation of women and to provide universal and equitable access for all to safe and affordable drinking water and adequate sanitation and hygiene, in particular in schools, public facilities and buildings, paying special attention to the specific needs of all”.

The Commission also expressed concern over the challenges faced by women and girls who are “disproportionately impacted by climate change, environmental issues and diverse types of extreme weather events”. It is imperative that countries recognize the critical role of women as agents of change and leaders in addressing climate change and disaster risk reduction, and promote a gender-responsive approach to extreme weather events.

Systematically addressing persistent gender gaps in the response to climate change is one of the most effective mechanisms for building climate resilience and serious gender considerations will need serious gender responsive data, indicators, monitoring, follow-up and review.

It is therefore vital for development actors to keep in mind that gendered dynamics of water underscores the close interlinkages between poverty, gender, climate change and sustainable development. The challenge is to continue to explore ways and means to bridge the gap between conceptual comprehension of gender issues and everyday grassroots realities of differential access to and use of water, as well as when considering disaster risk reduction and climate change.

## 2. WATER SECURITY AND THE SDGs IN MYANMAR

### 2.1 Introduction<sup>2</sup>

Although the overall availability of water is abundant, there are distinct regional differences with e.g. lack of water or rather difficult and costly access to the water resources (e.g. Ayeyarwaddy River) in the Central Dry Zone and salinisation in the Ayeyarwady Delta area, and flooding in the deltas, flash floods in the mountains and Dry Zone, cyclones and surges along the coast are primary hazards. Inadequate rural and urban drainage cause trouble and damage.

The availability of safe drinking water depends on reservoirs, communal ponds, and private collection of rainwater and groundwater. Many groundwater resources are either saline – in the coastal area – or contaminated, predominantly by – natural – arsenic.

Myanmar has frequently suffered from destructive earthquakes, water-related extreme weathers such as cyclones, periodic flooding, as well as droughts, which resulted in many losses and damages including landslides, with major challenges in terms water quality control and wastewater management, quite similar in fact to the challenges that other countries in the South East Asian region are facing.

Future socioeconomic perspectives such as economic growth and population increase and the associated pressure these have on water, need to be taken into account when one is formulating a vision and concrete and feasible strategies for water resources management: higher demands for agricultural and domestic water, potentially a boom in the demand for industrial water and consequent pollution problems, which is very vivid in the Uru river for example, a sharp increase in the demand for hydropower.

Climate change tends to add to this pressure: increased risks of river floods, changing courses and magnitude of cyclones, longer droughts are key factors to be considered for future integrated water resources planning, implementation and management.

The interrelation between water, food, and energy security provides a useful framework to analyse tradeoffs, because food and energy production will have a large impact on the water resources, and vice versa. Regional differences require special attention. The different characteristics of each region require diversification of strategies per region which follow logically from the potential water supply in combination with the envisaged socio economic development.

There were many development partners including the World Bank Group and the Asian Development Bank. The National Water Resources Committee was established in July 2013 and since then water related activities and institutional review began. Myanmar National Water Policy was drafted by the public intellectuals and water professionals and six public

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<sup>2</sup> Extracts from Myanmar Integrated Water Resources Management Strategic Study "From Vision to Action"

consultations were made in six key regions of Myanmar. It took two years to go many rounds of consultations and editing. Finally in 2014 the first edition was disseminated at the World Water Day 2014. In 2015 Cabinet of Myanmar approved the third edition of the National Water Policy. Currently the World Bank is assisting the drafting process of Myanmar Water Law and Institutional review as part of the Ayeyarwady Integrated River Basin Management Project.

Last three years, from 2013 to 2015, Myanmar has shown impressive strides forwards towards integrated and sustainable water resources management, supported by the core of Myanmar's water professionals, public intellectuals, academia and civil society leaders locally and from abroad. Myanmar's water activities are recognized by its neighbors in South East Asia as well as UN-Water.

Myanmar is currently undergoing an important water sector reform and the 2030 Agenda with its 17 SDGs provide a framework that can contribute to better orient several sector policies and strategies. The paragraphs below propose to focus on key SDGs that are directly or indirectly relevant for the water sector in Myanmar.

## 2.2 No poverty (SDG 1)

To reduce rural poverty in Myanmar, first and foremost it will take an increase in agricultural productivity to make farmers richer. More than half of Myanmar's labour force works in agriculture, but the average yield of the dominant crop, paddy rice is amongst the lowest in Asia. Difficulties include high fertilizer prices and a shortage of labour during times of harvest. Boosting productivity and thus profitability will require reform to increase the availability and adoption of modern farm technologies, as well as investments in seeds and extension services.

At present, 80 percent of the rural population lacks access to electricity. 37 percent lack access to clean drinking water and only 12 percent of roads are paved, which can make them impassable in the rainy season. Policies reforms and investment to empower rural communities start from 2012 to 2015. The level of general purpose transfers from the union level to States and Regions has increased from 0.6 percent of GDP to 2.3 percent.

This allows states and regions to fund important economic services (such as local roads, transport and communications, small scale energy projects and cottage industries) that are critical to rural development. The country's national community driven development program, launched in 2013. The 2015 Myanmar Poverty and Household Living Conditions Survey, provide a more complete snapshot of the needs and profile of the poor.

## 2.3 Food Security (SDG 2)

The dry zone of Central Myanmar is the most water-scarce area in the country. Due to the changing climate, variations in water scarcity are more and more prominent, which in turn impacts on the food security. In this region farmers hardly receive enough rain to grow dry crops in some years. For example, a study of 630 households revealed that 19 percent

reported receiving sufficient water only in the rainy and winter seasons and 5 percent reported sufficient water only in the rainy season.

To overcome the water scarcity variation and the food security in the dry zone and all over the country government organizations, local civil societies and agriculture water users need to cooperate and coordinate with each other in their available water resources development and management activities in respective areas.

Water for agricultural use in Myanmar is 91% of total water use, however, there is no systematic water allocation and water accounting system. The new democratic government is attracting financial and technical support, investments and many trade and industrial activities even within one and a half month of its rein. With this dynamics Myanmar needs an APEX body, which can lead the water sector reform in democratic way in order to support the national development plan.

## 2.4 Gender equality (SDG 5)

The gender issues are not concentrated on women alone; they are focused on the relationship between men and women in society. The actions and attitudes on the part of men and boys play a cardinal role in our attempt to achieve the gender equality. Women's empowerment is an important aspect to achieve gender equality. Equity for women means progress for all.

Traditionally, women have taken the back seat in Myanmar society until 2000s when the rising living expenses forced many women from their homes to the workplace to become earners themselves. Village tract administrators, present in rural areas, or ward administrators in urban areas have a direct line of communication with township administrators and form a bridge between township administration and the people living in the wards and village tracts. Prior to 2012, local administrators were appointed by Government.

Since 2012, local administrators have been elected from a group of nominated 10 household heads. Little was known about Myanmar's tiny fraction of female administrators, until a nationwide local governance mapping exercise conducted by the United Nations Development Programme (UNDP) together with the General Administration Department, under the Ministry of Home Affairs, revealed that during the first election held over 2012-2013, only 42 women were elected, constituting 0.25 percent of the total 16,785 ward/village tract administrators (W/VTA). Daily duties: meeting people, listening to their concerns, noting conditions of the roads, water reservoirs, other infrastructure and an aspiration to aim for greater leadership heights. With the migration of men increasing, need more gender-sensitive farming approaches, while also strengthening education and building effective networks for knowledge sharing.

## 2.5 Clean Water and Sanitation (SDG 6)

The 2014 Census shows that almost 30% of the population does not have access to improved water sources and 25% does not have access to improved toilets. In rural areas, 3.1 million households do not have access to improved water sources, 1.07 million households are using unimproved toilets and another 1.5 million households do not have toilets. The 2010 UNICEF

School WASH surveys shows that about half of schools do not have a water source within school compound and only 23% of schools met the international benchmark of 1 toilet per 25 students. Hand washing points in schools are often far from toilets and disability aspects are largely unaddressed. There are still 240,000 IDPs (Rakhine-65%, Kachin-45%) who needs continued lifesaving WASH services and currently this is largely managed under the coordination of the WASH Cluster. The 2015 floods and landslides affected 12 out of 14 states and resulted in almost 6 billion MMK in damage and losses to water and sanitation infrastructure.

The sector lacks policy, strategy and targets. As a result, best practices in the planning, delivery and maintenance of infrastructure and services have not been identified and taken to scale. There is a lack of reliable and detailed information on the adequacy and coverage of existing water supply and sanitation services. As a result, investment forecasting is currently weak.

Law enforcement is needed to illegal gold mine on farms and forest reserves, which creates environmental problems, including deforestation, the extinction of lakes and reservoirs and also impact on health. Waste water treatment facility constructed for no environmental effect by the industrial waste water released from the Mandalay industrial zone. Pipeline carrying waste water toward the river were helpful in eliminating bad odours caused by the presence of wastewater in the industrial zone. For Yangon area sewage treatment plant has already constructed before it is released into the river. Yangon City Development Committee is doing effective water management for Yangon city.

Rules and regulations for water quality management, water quality monitoring system, technology transfer for waste water treatment, awareness of project owners and the public and regional and international cooperation are needs for the future works.

## 2.6 Affordable and clean energy (SDG 7)

Myanmar has adopted an energy saving goal to reduce energy consumption by 12 percent by 2020, 16 percent by 2025 and 20 percent by 2030. The goal is aimed at promoting energy efficiency and energy conservation, thereby reducing greenhouse gas emission and contributing towards environmental conservation. Myanmar formed its National Energy Management Committee in January 2013 to promote energy efficiency through the implementation of short and long term plans.

An energy saving department was also formed under the Ministry of Industry to boost the implementation process for meeting the target of reducing energy consumption annually in the country. According to the department under the Ministry of Industry is conducting training courses on energy efficiency in Yangon and Mandalay in cooperation with United Nations Industrial Development Organization. Plans are underway to heighten energy efficiency awareness among the public in regions and states. Present Electrification ratio is only 33 percent and water can bring most of the rest 67 percent into Light. Working trend is moving to Public Private Partnership.

There is a plan of waste to energy plant in Yangon aims to reduce methane, carbon dioxide transmission. 300 KW from 700 KW produced by the plant will go to Yangon residents through national grid line, planning to generate electricity from 60 tons of waste materials per day.

## 2.7 Climate action (SDG 13)

SDG 13 is to take urgent action to combat climate change and its impact. The United Nations Framework Convention on Climate Change (UNFCCC), the primary intergovernmental forum for negotiating the global response to climate change, unanimously recognized the need for bold action at the Conference of Parties (COP) 21 in Paris last year, at which governments agreed to hold the increase in the global average temperature to well below 2°C above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5°C.

Myanmar is one of the most vulnerable countries in the world due to climate change and is very alarming. Among the major impacts of the climate change, particularly of the global warming, the increasing rise in sea levels every year has been the most alarming one so far, with the possibility of submerging a substantial portion of 'flood-prone' coastal areas of Myanmar under water by 2050 (a prediction made in the 4th assessment report by the International Panel on Climate Change or IPCC). The rise in sea levels has been causing more floods, especially during storms. With flat and low lying land scape, the whole coastal area of Myanmar is highly vulnerable to such floods and storms.

A sizable portion of Myanmar's population live in the coastal areas, where majority of the population are affected, directly or indirectly, by coastal floods or tidal flows, salinity, tropical cyclones, erosion of river bank etc. With the rise of sea level 'even by a meter', Myanmar could lose a substantial percentage of its total coastal landmass under the sea water, turning millions of inhabitants living in the coastal areas of Myanmar into climate refugees.

Moreover, the fresh water sources in the coastal areas of Myanmar face deep intrusion of saline water from the Bay of Bengal during the dry season. Agriculture, industry, school hospitals, roads bridges, livelihoods, marine resources, forestry, biodiversity, human health and other utility services will suffer severely. Myanmar must start addressing these above mentioned concerns with utmost urgency in the global platforms. The greatest challenge is to prepare for extreme climate events. A combination of structure measures (such as flood prevention structures) and non-structural measures will work best. In addition to floods, droughts also need to be addressed through integrated drought management. Farmers' access to science-backed knowledge and best practices for coping with drought needs to be improved.

Parliamentarians submitted urgent motion call on the Union government to adapt risk mitigation measures against the negative effects of El Nino, which is expected to hit Myanmar this year. It is important to take necessary measures to guarantee the socioeconomic wellbeing of the people, including farmers, as agricultural outputs and fishery exports are likely to be limited by the consequences of El Nino. The government urged to be involved in the agriculture, food security, water supply, electricity, health, fishery, water transportation and tourism sectors to take precautionary measures.

According to Myanmar Fisheries Federation, there is a prediction that the country's fisheries sector is likely to get worse in 2016 than in previous years due to natural disaster affected inland fisheries and shortage of fish stock to catch in the waters of the country. Developing of illegal fish farming with the use of inappropriate methods, climate change and decreasing of mangroves have led to the decline of fisheries resources. Urged need people to promote participation in sustainable management of fisheries resources and biodiversity conservation activities.

## 2.8 Opportunities to meet the 2030 Agenda and water related SDGs

Sustainable development requires whole of government approaches to economic, social and environmental policies. Engagement is also required from all sectors of society. To educate public, to promote better understanding the problem, to gain better sense of public priorities, to build trust in the authorities, to get more ideas and various reasons, public participation is important.

About a third of the population still lives in extreme poverty. Almost three quarters of children in rural Myanmar grow up in homes without electricity and 29 percent of children graduate from secondary school. Myanmar agriculture sector is a good place to start examining how water has been utilized and improve water use efficiency as well as water governance. The agriculture sector employs 65 percent of the country's labour force, but suffers from low productivity. The average rice paddy yields 2.5 tons per hectare, only half the amount of other exporters in the region with 91% of total freshwater use.

New investments to enhance agricultural productivity by supplying quality seeds, water efficient farming techniques as well as adopting modern farm technologies can raise incomes for farm families, which comprise most of Myanmar's poor. Such steps can enable a structural shift for the rural work force to more labour-intensive and higher productivity sectors and sustainable reductions in poverty and inequality. Inclusive growth also means greater investment in Myanmar's greatest resource-its people by ensuring education for all, health care for all, and energy for all.

Providing these essential services will require policy to ensure sound public financing through tax collection, sound public spending, and public investments that favour infrastructure and human development. Infrastructure investments can spur private sector job growth and support more productive and labour-intensive economic activities, such as manufacturing and textile production. Today Myanmar faces both the opportunity and the challenge of building on the development gains.

If the new government could create an extended period of inclusive growth and transformation for the entire country, when everyone benefits and is engaged, it will result in successful reconciliation and a lasting peace. Water resources management good practices can catalyze such a peace process. It is the people of Myanmar who will make the critical decisions that will guide the development of their country. The international community, including multilateral institutions like the World Bank group, already play an important supportive role.

## 2.9 Conclusions

Need to turn Myanmar into a water efficient country by fully implementing the country's integrated water resources management plan by 2020. Importance of investing in the water sector, including water supply and sanitation, personal hygiene, environmental cleanliness, navigation, water transport, irrigation and hydropower, in order to maintain parallel infrastructure development and capacity building in human resources.

Calling for cooperation between the government and the people, to promote the water sector, the Myanmar Water Think Tank emphasized the need for public awareness, participation, consultation, legislation, regulation, institutional arrangement and education on sustainable water management and need for highest level coordination body such as a National Water Committee which can be placed under the President's office. The country is implementing the process of ensuring integrated water resources management in cooperation with the Netherlands, Australia, Japan, the World Bank and other international organizations on water sector development.

The Global Water Partnership (GWP) is the first initiator to introduce the concept of Integrated Water Resources Management (IWRM) in the country Myanmar through its Regional Water Partnership (GWP-SEA) and Country Water Partnership (MmWP). MmWP's constitution was drafted under the old regime and it never take off until now. It is time to revisit the constitution under the democratic principles to match with the new government's policy and outlook. Again it is up to the Myanmar water professionals, public intellectuals and all stakeholders who will take part in new form of MmWP. International community and development partners as well as the World Bank and ADB will remain in supporting role.

### 3. WATER SECURITY IN SOUTH EAST ASIA

#### 3.1 Water Security Key Challenges

Water Security is under threat in the South East Asian Region, due to many sources: population growth, urbanization, increasing water pollution, the over-abstraction of groundwater, water-related disasters, and climate change. Current planning and management have proven insufficient to address the challenges of meeting society's diverse needs for water.

Improving agricultural water productivity, achieving energy objectives, satisfying growing industrial water requirements, and protecting water quality and vitally important natural ecosystems are challenges we still face. The social, economic, and political consequences of water shortages are real, as are the effects of water-related disasters exacerbated by climate change<sup>3</sup>.

According to the Asian Water Development Outlook, 90% of the world's disasters are water-related and 90% of the global population affected by water-related disasters lives in Asia. Southeast Asia<sup>4</sup> is highly vulnerable to climate change as a large proportion of the population and economic activity is concentrated along coastlines; the region is heavily reliant on agriculture for livelihoods; there is a high dependence on natural resources and forestry; and the level of extreme poverty remains high.

#### 3.2 The case of the Mekong Sub – Region<sup>5</sup>

In the Mekong River Basin (MRB) more than 70 million people live in 6 riparian countries: China and Myanmar (in the Upper Mekong Basin) and Thailand, Lao PDR, Cambodia and Vietnam (in the Lower Mekong Basin).

The Mekong, one of the world's greatest rivers, is a complex system with high intra-annual and inter-annual flow variability caused by the Southwest Monsoon, bringing both great risks and opportunities. These risks are growing as populations and economies grow and climate change advances, putting more people and assets in harm's way, as recent droughts and floods in the region have demonstrated. These events have made the improvement water security a priority of the Governments in the basin and the Mekong River Commission (MRC).

Assessments of the MRC demonstrate that addressing drought and flood related water security issues requires cooperation between the basin countries on joint management and development projects, along with cost and benefit sharing deals. The recently updated Basin Development Strategy for 2016-2020 prioritizes joint projects and provides directions for

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<sup>3</sup> Mohamed Ait Khadi, Foreword in the Asia Water Outlook 2013, ADB, APWF

<sup>4</sup> ASEAN Cooperation on Environment

<sup>5</sup> By H.E Watt Botkasal, Deputy Secretary General, Cambodia National Mekong Committee

their planning. At the recent MRC regional meeting in February 2016, the Lower Mekong Basin Countries agreed to jointly prepare six joint projects, including:

- Integrated development and management of the Cambodian and Viet Nam Mekong delta (Cambodia and Viet Nam, with engagement of other basin countries);
- Sustainable water resources investments and management in the Sesan, Srepok and Sekong river basins (Cambodia, Lao PDR and Viet Nam, with engagement of Thailand);
- Cross border water resources development and management in the Khone Falls area, including environmental impact monitoring of Don Sahong hydropower project (Cambodia and Lao PDR, with engagement of other basin countries);
- Integrated water resources development and management in a shared river basin between Thailand and Cambodia (in Sub-area 9C-9T).

The significant and long-term investment that the MRC has made in data and knowledge will greatly facilitate the preparation of these projects for investments and implementation. The development of such projects will lead inevitably to higher levels of transboundary cooperation, benefiting many sectors (such as food, energy, navigation, tourism, and flood protection), and thus advance ASEAN integration.

Regional and bilateral cooperation must be enhanced for better flood preparedness such as in implementing flood preparedness programs, community early warning systems, flood damage / needs assessment, and flood emergency response contributing to the overall flood risk reduction initiative by the national governments.

***“Mekong Regional Flood Management”***. Transboundary flood issues are of major importance and it was agreed that they must be managed in a coordinated manner, promoting inter-governmental and inter-agency cooperation while being based on IWRM principles. Data and information on floods management and monitoring are required to be shared with sufficient technical capacity and hydromet systems operation in each country.

(Source: H.E. Watt Botkasal, Chair GWP SEA)

### 3.3 Climate Change issues in the South East Asian Region

A study carried out by Asian Development Bank (ADB) revealed that the mean temperature in the region increased by 0.1 to 0.3 degree Celsius per decade between 1951 and 2000; rainfall trended downward from 1960 to 2000; and sea levels have risen 1 to 3 millimeters per year. Heat waves, droughts, floods, and tropical cyclones have also become more intense and frequent. The same study projects a 4.8 degrees Celsius rise in mean annual temperature and a 70 centimeters rise in mean sea level by 2100 in Indonesia, the Philippines, Thailand and Viet Nam.

A rise in sea level would result in major problems for many of ASEAN's largest coastal cities, such as Jakarta, Bangkok and Manila. Millions of people may have to be resettled and massive expenditures incurred to protect the coastal cities. Projections of economic losses by the ADB study include a decline up to 50 percent of rice yield potential by 2100 and a loss of 6.7 percent of combined gross domestic product (GDP) each year by 2100. Other effects of climate change to the region include an increase of GHGs in the atmosphere partly due to low carbon sequestration potential of forests, increasing water stress, as well as adverse impact on human health.

### 3.4 Change in the way floods are being managed

The flood management paradigm is now progressively evolving, from a reactive to a more proactive approach. "Traditional" approaches to flood management, namely "flood defense," or "flood control" now seem inadequate. Floods are no longer caused by rainfall alone, and are the result of greater interaction between human society and the natural environment.

Structural defense systems alone cannot address the emerging challenges, therefore non-structural solutions such as watershed management, sustainable farming, risk education, community preparedness with a gender perspective and early warning should be the integral part of the flood management therefore integrated water resources management.

The "**Living with Floods**" concept, currently applied in Malaysia, recognizes that it is not possible to completely eliminate floods in the context of climate change due to design limitations. However, floods' negative impacts can be reduced through an understanding of flood risks and by working towards modifying this risk-generation process in a holistic manner, where all members of the society, men and women are involved.

(Source: Mr. Rozman Mohamad, Secretary, Malaysia Water Partnership)

Green cities development calls for holistic planning and management of water, flood, solid waste, storm water, ecosystems, and wastewater. To enhance resilience to climate change, it is necessary to strengthen knowledge about its impacts on water resources, strengthen capacities to move into action with participatory and holistic approaches, and ensure investments focusing on 'no regret' options and ecosystem-based approaches to flood management.

***“National policy on flood management in Indonesia”***. To fight floods from upstream to downstream an integrated approach is necessary, with two dimensions, structural and non-structural. Structural measures include upstream reservoir development, rehabilitation of ponds and reforestation; downstream floodway development, river normalization, polder development, flood control infrastructure, coastal protection, land subsistence control. Non-structural measures include spatial and zoning control, community empowerment, early warning system, flood prone mapping, emergency response, housing plan, disaster management, watershed management, flood hazard information system, public information and campaign, socialization, gender awareness raising and community negotiation.

(Source: Dr. Mochammad Amron, GWP Steering Committee Member)