ESCAP Strategy Paper

Improving Urban Water and Sanitation Services in Kathmandu Valley, Nepal

(An activity of the ESCAP in Addressing Water and Sanitation Issues within the framework of the 2030 Agenda for Sustainable Development in South and South-West Asia)

Final Report

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Acronyms

ADB	Asian Development Bank
BAP	Bagmati Action Plan
CBOs	Community-based Organisations
DEWATS	Decentralised Wastewater Treatment System
DFID	UK Department for International Development
DRR	Disaster Risk Reduction
DoUDBC	Department of Urban Development and Building Construction
DWRC	District Water Resource Committee
ECOSOC	Economic and Social Council of the United Nations
ESCAP	United Nations Economic and Social Commission for Asia and the Pacific
EU	European Union
FEDWASUN	Federation of Drinking Water and Sanitation Users Nepal
FINNIDA	Finnish International Development Agency
FY	Fiscal Year
GDP	Gross Domestic Product
GNI	Gross National Income
GoN	Government of Nepal
HALT	Housing and Land Tax
HPCIDBC	High Powered Committee for Integrated Development of Bagmati Civilisation
ICT	Information, Communication and Technology
I/N-NGO	International/National Non-Governmental Organisation
IPT	Integrated Property Tax
KMC	Kathmandu Metropolitan City
KUKL	Kathmandu Upatyaka Khanepani Limited
KVDA	Kathmandu Valley Development Authority
KVWSMB	Kathmandu Valley Water Supply Management Board
LSUDA	Local Sustainable Urban Development Agenda
LTDP	Long-term Development Concept Plan
MCPC	Minimum Conditions and performance Measures
MDGs	Millennium Development Goals
MLD	Million litres per day
MoAD	Ministry of Agriculture Development
MoF	Ministry of Finance
MoFALD	Ministry of Federal Affairs and Local Development
MoHP	Ministry of Health and Population
MoPE	Ministry of Population and Environment
MoUD	Ministry of Urban Development
MoWSS	Ministry of Water Supply and Sanitation
NAP/MoPE	National Adaptation Plan/Ministry of Population and Environment
NEWHWA	Nepal Water for Health and Water Aid
NGOFUWS	Non-governmental Organisation Forum for Urban Water and Sanitation
NGOs	Non-governmental Organisations
NLC	Nepal Law Commission
NLSS	Nepal Living Standard Survey

NPC	National Planning Commission
NTNC	National Trust for Nature Conservation
NUA	New Urban Agenda
NWSC	Nepal Water Supply Corporation
ODA	Official Development Assistance
ODF	Open Defecation Free
OSR	Own Source Revenue
PID	Project Implementation Directorate
SD	Sustainable Development
SDAN	Sustainable Development Agenda for Nepal
SDGs	Sustainable Development Goals
SDMP	Strategic Development Master Plan
SUD	Sustainable Urban Development
SWM	Solid Wastes Management
TDF	Town Development Fund
TSP	Total Suspended Particulate
UNDP	United Nations Development Programmes
UNICEF	United Nations Children Fund
UNCSD	UN Commission on Sustainable Development
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
WatSan	Water and Sanitation
WB	World Bank
WCED	World Commission on Environment and Development
WHO	World Health Organisation
WSMB	Water Supply Management Board
WUAs	Water Users Associations
WWTP	Waste Water Treatment Plant
3R	Reduce, Reuse and Recycle

Executive Summary

The United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) is supporting its Member States to enhance the capacity of policy-makers to minimize water scarcity and improve sanitation. At the request of KVDA, ESCAP supported to develop this Strategy Paper on urban water and sanitation services in Kathmandu Valley. This Paper informs key national institutions responsible for water and sanitation for linking national needs and priorities with 2030 Agenda for Sustainable Development and New Urban Agenda (NUA). This will help achieve SDG 6 (ensure availability and sustainable management of water and sanitation for all) and SDG 11 (make cities and human settlements inclusive, safe, resilient and sustainable) of 2030 Agenda, and provide water and sanitation related guidance for the implementation of NUA. This Strategy accommodates the need for conserving traditional water systems and promoting rainwater harvesting, groundwater conservation, faecal sludge management, including capacity building, and mobilization of resources to enable integrated implementation of SDGs in Kathmandu Valley.

The Kathmandu Valley has a total population of over 2.4 million spread in a total area of 716 km^2 in three districts (Kathmandu, Lalitpur and Bhaktapur) comprising 229 wards of 2 metropolitan cities and 16 municipalities. Since March 2017, the whole Valley is officially represented by municipalities, de facto urban areas. The Valley is facing several environmental challenges due to high pollution pressure, inadequate water supply and sanitation facilities, and "inaction over the realised challenges". The "capital-centric" education and health facilities and decade-long political disturbances between 1995 and 2005 also attracted more people to the capital for safety, and security which created additional pressures on demand and supply of drinking water and sanitation facilities, wastes and wastewater management.

In Kathmandu Valley, 72 % of households have access to piped water. Water demand is around 350 million MLD but KUKL only provides 90 million MLD in dry season and 150 million MLD in wet season. Insufficient water is met from private vendors (over 400 tankers), deep boring (about 500 deep wells used) and other sources. In 2006, 382 stone spouts were reported and 237 stone spouts still serve as independent water sources catering to approximately 10 % of population. The Melamchi Water Supply Project is expected to meet the increasing demand for drinking water in the Valley.

98 % of total households have access to sanitation and 99% have toilets in the Valley. About one-third of the water samples of deep tube wells and 44 % of shallow tube wells were found contaminated with coliform and non-compliant with the National Drinking Water Quality Standards (2006). Polluted water and poor sanitation has accelerated diarrhoea, dysenteries, typhoid and paratyphoid with occasional loss of life. Only one of the five wastewater treatment plants is functional. Few reed bed wastewater treatment facilities are in operation. Large volumes of domestic and industrial wastewaters are directly discharged into the Bagmati River system without any treatment.

The Constitution of Nepal (2015) stipulates access to drinking water and sanitation as a fundamental right of the citizens. In addition to national policies, legal measures and programmes, the 2030 Agenda for Sustainable Development and New Urban Agenda have emphasised the need of water and sanitation services in urban areas.

This Study assesses the state and effects of water and sanitation, identifies key challenges, explores opportunities in managing scarce water and improving sanitation facilities by addressing relevant sustainable development goals (SDGs), New Urban Agenda and other commitments of national importance. The report also documents gaps and needs, and proposes strategic actions for urban areas of Kathmandu Valley. This Strategy Paper is based on extensive literature review, consultations and inputs from relevant experts.

Nepal is actively engaged in implementing 2030 Agenda for Sustainable Development and the New Urban Agenda. The national targets and indicators on SDGs were developed in 2015. The progress of some SDGs targets implementations were reviewed and shared with international community in mid-2017 and other targets including 6 and 11 are under review (in June-August 2017) to prepare target-specific indicators.

Relevant policies, plans and programmes focus on construction of public toilets, rainwater harvesting and regulated groundwater extraction, promotion of decentralized wastewater treatment systems, and drinking water supply in urban areas. The Water, Sanitation and Hygiene Sector Development Plan (2016) realizes, inter alia, the importance of strengthening facilities for water security, sanitation, solid waste collection, sanitary landfill sites, adoption of 3R (reduce, reuse and recycle) and establishment of a dedicated solid waste management unit in municipalities. The framework and guidelines equally focus on sustained management and use of wastes, faecal sludge and groundwater.

Access to clean drinking water and sanitation services is the fundamental right of every Nepali citizen. Authorities at Local Level (municipalities) have the "power" to adequately formulate, implement and regulate water supply, health and basic sanitation-related policies, laws and standards. Such authorities are the ones that are responsible for providing safe water and healthy foods, control air and noise pollution, and launch awareness activities to improve sanitation condition, including use of 3R approach. Additionally, municipalities are also responsible for fixing water tax and activities related to drinking water and preparation of a profile of natural resources. Regulatory provisions of Water Supply Management Board Act (2006) including guidelines, framework and standards also provide ample opportunities to regulate, manage, and provide safe water and sanitation services in municipalities. Similarly, a number of policy-making and implementing institutions are in place to support implementation of sanitation improvement activities in Kathmandu Valley. Furthermore, a number of coordination arrangements are made for ensuring quality service.

The Strategy

However, these efforts have proved inadequate and ineffective due to increase in unmanaged settlements, population pressure, pollution load and additional gap between water demand and supply. Drinking water is extremely inadequate, sewer drains are directly discharged into rivers without any prior treatment, sludge is also discharged into public drains, and water conservation has yet to receive required attention. In order to address these challenges and maximise benefits from water supply and sanitation facilities, this Strategy document proposes suitable actions. The Strategy has a vision of providing everyone safe water and sanitation in Kathmandu Valley by 2030. Its Mission is to improve access to safe water, sanitation and hygiene and affordable housing in Kathmandu Valley. The following paragraphs focus on goals, objectives, strategies and actions:

The Strategic goals are to: (i) provide equal access to safe water and improved sanitation facilities; (ii) provide affordable and resilient housing with wastewater and faecal sludge management facilities; (iii) conserve traditional and groundwater sources; and (iv) strengthen resource mobilisation with non-polluting technologies and enhanced institutional and individual capacity.

The objective is to provide adequate and safe drinking water, improve water use efficiency and adopt 3R practices by ensuring wastewater and faecal sludge management, rainwater harvesting, and conserving traditional and groundwater resources. The specific objectives are to: (i) effectively implement existing policies, standards, guidelines and frameworks to manage water and sanitation for all, and provide safe and affordable housing with basic services; (ii) integrate safe water supply and sanitation facilities in new policies, programmes and activities to reduce health implications from water-borne and sanitation and hygiene-related diseases; (iii) ensure compliance with national standards on water quality and basic sanitation and housing norms; (iv) explore and access domestic and international financial resources and build enhance institutional and individual capacity to manage solid wastes, wastewater and faecal sludge,

and conserve water sources; and (v) align development of water supply and sanitation facilities with SDGs 6 and 11, and New Urban Agenda.

Following the broad guiding principles of, inter alia, encouraging municipalities to prepare and implement local sustainable urban development agenda (LSUDA) with adequate focus on safe water and improved sanitation, promoting users and multi-stakeholders participation, and using standard practices, the Strategy proposes to: (i) implement existing instruments (policies, plans and programmes) by integrating into annual plans and programmes; (ii) integrate relevant SDGs into local plans and programmes; (iii) localise SDGs by preparing and implementing LSUDA(Kathmandu Agenda); (iv) creating incentives by developing and implementing economic instruments, recognising good practices, and providing concessional finances; (v) price water and sanitation services using study outcomes on the "willingness to pay"; (vi) promote data generation and monitoring; (vii) strengthen water and sanitation infrastructures; and (viii) define and expand means of implementation, in particular finance, technology, and capacity building. The Strategy Paper also outlines priority actions for 2030 Agenda that urge, inter alia, to: (i) identify existing theme-based (water supply and sanitation) actions; (ii) integrate rainwater harvesting, water purification, 3R approach, DEWATS, faecal sludge management and groundwater recharge options into municipality plans and programmes; (iii) include provision for rainwater harvesting, groundwater recharge and DEWATS in construction permit of multi-storey public and commercial buildings; (iv) prepare and implement LSUDA for Kathmandu Valley; (v) ensure multi-stakeholders" participation in water supply and sanitation facilities; (vi) generate and share knowledge and learning; (vii) include water and sanitation services in metropolitan cities/municipalities' performance review criteria for annual grant scheme; and (viii) support municipalities/cities to access funding from different sources.

The Strategy outlines key barriers and risks in implementing existing instruments, financing and budgeting, and service delivery. It considers political commitments as reflected in recent election manifesto as opportunities, utilising existing experiences and learning, rethinking communication approaches, revisiting national gaps and needs to provide safe drinking water and improved sanitation services to the people of Kathmandu Valley in the spirit of SDGs 6 and 11, and New Urban Agenda.

Implementation arrangement

This Strategy calls for strengthening cities/municipalities, and promoting inclusive multi-stakeholder partnership such as triangular public-private-civil society/academe partnership with clear means of implementation such as fund generation and mobilisation, technology use, capacity building and handling systemic issues to revitalise coordination mechanism, develop in-built mechanism for data generation in municipalities, promote ICT, and establish systematic follow-up and review of water and sanitation facilities in the spirit of 2030 Agenda for Sustainable Development, and New Urban Agenda. The Strategy also proposes implementing strategic actions through annual programmes of municipalities, impact and performance monitoring, and encouraging MoUD in collaboration with MoWSS, MoFALD, MoH, MoPE, KVDA, DoUDBC, KVWSMB and metropolitan cities/municipalities to jointly prepare LSUDA for Kathmandu Valley and assist in its implementation to address SDGs and outcome of Habitat III to meet demands for safe drinking water and improved sanitation facilities. In summary, LSUDA provides municipalities to further realise key elements of SDGs and NUA and reflect political commitment of newly elected bodies and implement it through coordinated efforts.

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Chapter One

INTRODUCTION

1.1 Background

The Environment and Development Division of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) in its regular programme of technical cooperation has an important activity of *addressing water and sanitation issues in South and South-West Asia within the framework of the 2030 Agenda for Sustainable Development.* This activity aims to *enhance the capacity of policy-makers to minimize water scarcity and improve sanitation within an integrated approach for natural resource management at the city level, supporting sustainable urban development and (SUD) the Sustainable Development Goals (SDGs)*. Its objective is to *improve policies for integrating environment into urban development, and management of water resources.*

ESCAP, at the request of the Kathmandu Valley Development Authority (KVDA), Ministry of Urban Development (MoUD) of the Government of Nepal, has initiated a national participatory process to develop a *Strategy Paper on urban water and sanitation services in Kathmandu Valley*. The paper will inform national institutions about strategies for linking national needs and priorities with the internationally agreed 2030 Agenda for Sustainable Development (2030 Agenda) and New Urban Agenda (NUA; an outcome of 2016 Habitat III Conference). The initiative will enhance participation of MoUD, Ministry of Water Supply and Sanitation (MoWSS), Department of Water Supply and Sewerage (DoWSS), Metropolitan Cities and Municipalities and institutions engaged in improving water and sanitation services in Kathmandu Valley. The primary purpose of the initiative is to help minimise urban water scarcity and improve sanitation, including faecal sludge management, integrated approach for natural resource management, and to achieve SUD and the 2030 Agenda. The initiative will help strategise synergistic implementation of national and local efforts for achieving SDG 11 (make cities and human settlements inclusive, safe, resilient and sustainable) and SDG 6 (ensure availability and sustainable management of water and sanitation for all). In addition, the initiative will provide water and sanitation related guidance for implementation of the New Urban Agenda (NUA), an outcome of the Habitat III Conference.

This document describes some important solutions for sustainable urban water and sanitation management, such as systems for rainwater harvesting, groundwater conservation, and faecal sludge management, with a focus in implementing policies, building capacity of key actors/stakeholders, and mobilising resources to enable integrated implementation of SDGs in Kathmandu Valley.

ESCAP, jointly with KVDA, MoUD and MoWSS of the Government of Nepal organised a consultation meeting on 12 April 2017 in Kathmandu to discuss approaches on improving urban water and sanitation in Kathmandu Valley. ESCAP also organised a sub-regional workshop on urban water and sanitation services in South and South-West Asia in Kathmandu on 9-10 August 2017. The sub-regional workshop was attended by government delegates and experts of south Asian countries, including Islamic Republic of Iran to share their national experiences as well as to provide expert inputs on policies and programmes for sustainable urban water and sanitation management. The workshop outcome has been used to finalise this Strategy Paper.

1.2 Administrative Units of Nepal

Prior to 2015, Nepal was administratively managed in 5 development regions, 14 zones, 75 districts, and 58 municipalities and over 3000 Village Development Committees (VDCs). The Government declared 159 new municipalities (72 in May 2014, 61 in December 2014 and 26 in September 2015) by merging number of VDCs, and total number of municipalities reached to 217 by September 2015.

The Constitution of Nepal (2015) has categorised the country into 3 structures – the Federation, the State, and the Local level. There are 7 States with: (i) 14 districts in State No. 1; (ii) 8 districts in State No. 2; (iii)13 districts in State No. 3; (iv) 10 districts and east of Bardaghat-Susta of Nawalparasi district in State No. 4; (v) 10 districts (including west of Bardaghat of Nawalparasi-Susta, and eastern part of Rukum) in State No. 5; (vi) 9 districts and western part of Rukum district in State No. 6; and (vii) 9 districts in State No. 7. The Kathmandu Valley (Kathmandu, Lalitpur and Bhaktapur districts) is under the State No. 3. Election Area Determination Commission has proposed 165 seats for Federal Parliament, and 230 seats for Provincial Parliament in the last week of August 2017. The States 1 to 7 have 28, 32, 33, 18, 26, 12 and 16 election areas respectively. Based on this, 35 districts have only one election area and Kathmandu has 10 seats. The District Development Committees exist to coordinate development activities at the district level.

In Nepal, municipalities are designated *de facto* urban areas (cities and towns) that meet minimum criteria related to population, infrastructure and revenues (Table 1.1). Section 72 of the Local Self-Governance Act (1999) empowers the Government to specify any area which meets set criteria as a municipal area. The Government as per Section 88 of the Act may classify municipalities into: (i) Municipal Corporation; (ii) Sub-municipal Corporation; and (iii) Municipality. The criteria for municipal designation do not take into account relevant functional characteristics such as density, contiguity, and occupational structure.

Based on the report of the Local Level Restructuring Commission in March 2017, the Government has announced 744 local level administrative units (6 metropolitan cities 11 sub-metropolitan cities, 246 municipalities and 481 rural municipalities (Village Assemblies) in 7 States. The Commission has merged previous VDCs (over 3000) and 217 municipalities into either Village Assemblies or Municipalities. The Commission has categorised municipality taking into consideration, *inter alia*, the population, hospital beds, infrastructure, including a landfill site within its jurisdiction or ensuring reliable alternative management of such site, open spaces and park, and public toilet facilities.

However, annual revenue differs in Water Supply, Sanitation and Hygiene Sector Development Plan (SDP) which mentioned NRs. 100, 50 and 2 million (1m in mountain and hills) in metropolitan city, sub-metropolitan city and municipalities, respectively (MoWSS, 2016). The Government has tabled a Local Level Governance Operation Bill in June 2017 to the Parliament. The draft Bill has a provision to empower the Government to declare to any part of the country into a municipality, sub-metropolitan city and metropolitan city subject to the fulfilment of its requirements (criteria) (Annex 1.1).

Table 1.1: **Classification of Municipalities in Nepal**

Urban area	**Minimum population**	**Annual income (Rs. in millions)**	**Infrastructure**
Municipal Corporation (Metropolitan city)	300,000	400	Electricity, drinking water, telecommunications, main road and accessory roads of town pitched, facilities for health services and higher education with adequate opportunity for higher education and at least one university, and adequate urban facilities etc.
Sub-municipal Corporation (Sub-metropolitan city)	100,000	100	Same as above including having provisions of public gardens and city halls and urban facilities etc
Municipality	20,000 (10,000 in mountainous and hill areas)	5 (0.5 in the case of mountain and hill areas)	Semi-urban area, electricity, roads, drinking water, communications and similar other minimum urban facilities (even no road in case of mountain and hill areas)
Definition expanded by Urban Water Supply and Sanitation , 2009			
Secondary towns	10,000-50,000	No revenue criterion but population density of at least 10 persons per hectare and at least 50% population dependent on non-agriculture activities	Basic facilities such as grid electricity, telecommunications, secondary school and health services
Small towns	5,000-40,000		

Source: Section 88 of the Local Self-Governance Act (1999)

1.3 Kathmandu Valley

Nepal is experiencing rapid urbanisation. 17%% of the total population were considered as urban population in 2011 and the number is expected to reach 40 %% in early 2017 (MoWSS, 2017). Kathmandu Valley has 2 Metropolitan Cities and 16 Municipalities spread in a total area of 716 km^2. 47 %% of the total urban population of Nepal live in Kathmandu Valley, and Kathmandu Metropolitan City alone has one-third of the total urban population of Nepal. Population has increased from 0.76 million in 1981 to 2.4 million in 2011, nearly 4 times within the last three decades.

Total population in three districts (Kathmandu, Lalitpur and Bhaktapur) within the Valley is slightly over 2.4 million in 229 wards of 2 Metropolitan Cities and 16 municipalities. Of the three districts, Kathmandu alone has 1.7 million people. Kathmandu, Lalitpur and Bhaktapur districts have 11 (including one Metropolitan City), 3 (including one Metropolitan City) and 4 municipalities with population of 1.699, 0.425 and 0.299 million respectively. This comes to about 70, 18 and 12 %% of the total population for Kathmandu, Lalitpur and Bhaktapur districts with corresponding 61, 22 and 17 %% of the total area respectively (Annex 1.2). The whole area within

the Valley is officially declared as municipalities and they are politically and administratively treated as urban areas.

In order to manage urbanisation, Nepal's national report on Habitat III realises the importance of implementing "secondary cities" development programmes/projects to decentralise economic activities outside Kathmandu Valley, and strengthen KVDA for coordinated urban growth management and as unified planning body for Kathmandu Valley (MoUD, 2016). However, unplanned concentration of economic activities and investments in the Valley has resulted in unprecedented urban growth, accompanied with ecological and environmental challenges. The unique built environment and cultures in the traditional settlements of the Valley are at increased risks due to commercialization of land use (MoUD, 2016).

The Kathmandu Valley – the capital inhabited by key politicians, policy-makers and decision-makers – is facing "environmental challenges" due to increased pollution load, inadequate water supply and sanitation facilities and "inaction over the realised challenges". A "culture of shifting responsibility" has emerged in the recent years and it has greatly affected the service delivery. These have contributed to unsafe water, poor hygiene and inadequate sanitation. The "capital-centric" education and health facilities and decade-long political disturbance between 1995 and 2005 also invited more people into the capital for safety, and security which destabilised demand and supply of drinking water and sanitation facilities, wastes and wastewater management.

During the last two decades, policies, strategies and programmes were developed and partly implemented, however water supply and sanitation challenges have further cropped up. In addition to public sector, private sector is engaged in providing drinking water with about 425 tankers (which obtained licence from Kathmandu Valley Water Supply Management Board, KVWSMB) and in partial collection of wastes. Water supply and waste management receives greater attention at pre-, during and post-monsoon hot seasons due to increased level of water-borne, and vector-borne diseases.

1.4 2030 Agenda for Sustainable Development and National Initiatives

The World Commission on Environment and Development (WCED) in its 1987 report (Our Common Future), submitted to the UN Secretary-General has defined sustainable development (SD) as "… development that meets the needs of the present without compromising the ability of future generations to meet their own needs". This notion of SD has been integrated into global, regional, and national initiatives since the 1992 Rio "Earth Summit" (UN Conference on Environment and Development, held at Rio de Janeiro in June 1992). This Summit, attended by over 100 Heads of State and/or Government, reemphasised the urgency of moving towards attaining SD objectives. SD integrates three pillars: economic development, social development, and environment protection. Progress across all three pillars in a consolidated manner is seen as critical achievement of truly sustainable development.

The SD concept, promoted by the UN Environment and the UN Commission on Sustainable Development (UNCSD), is mandated to monitor and review progress towards globally agreed goals and targets for sustainable development. In 2012 (Rio+20), countries realised the need for SDGs. On 25 September 2015 in New York, 193 Member States of the United Nations unanimously adopted new global agenda to end poverty by 2030 and pursue a sustainable future. This agenda contains 17 goals and 169 targets with number of indicators. SDG 6 and SDG 11 are

dedicated to issues of water and sanitation, and urbanisation respectively. Goal 6 focuses on six targets including equitable access, improved quality, increased efficiency, integrated management, and protected resources (https://sustainabledevelopment.un.org/sdg6).

The New Urban Agenda (NUA), an outcome document of the Habitat III conference was adopted by Heads of State and Government, Ministers, and High Representatives at Quito, Ecuador in October 2016 (http://habitat3.org/wp-content/uploads/Habitat-III-New-Urban-Agenda-10-September-2016.pdf) (Annex 2.1). The NUA reaffirms global commitment for SUD which includes interlinked principles of urban resilience, disaster risk reduction, and climate change mitigation/adaption. The NUA commits to promoting, *inter alia*, equitable and affordable access to safe drinking water and sanitation, while recognizing the integrated challenges of water scarcity, water and air pollution, and vector-borne diseases that needs to overcome to achieve truly transformational change. This requires policies, strategies, capacity development and actions at all levels. In terms of water and sanitation, the Agenda calls for working to "equip public water and sanitation utilities with the capacity to implement sustainable water management systems" … and supporting decentralized decision-making on sustainable waste management systems. The NUA also suggests strategies for effective implementation, including the use of climate change funds to achieve the agreed upon goals.

Para 73 of Quito Implementation Plan for the New Urban Agenda

"We commit to promote conservation and sustainable use of water by rehabilitating water resources within the urban, peri-urban, and rural areas, reducing and treating waste water, minimizing water losses, promoting water reuse, and increasing water storage, retention, and recharge …."

Nepal is actively engaged in translating international commitments on sanitation and water into actions, including in SACoSan (South Asian Conference on Sanitation) to increase financing for sanitation activities. Nepal has effectively implemented MDGs, including Goal 7 (environmental sustainability) which was related to water and sanitation. The country is equally engaged in implementing the outcome of the Habitat III conference.

With involvement in preparing and adopting SDGs, Nepal has elaborated indicators for all 17 goals, except goal 14 (related to ocean). Goals 6 and 11 are directly related to this Strategy Paper. Eight global targets are identified for Goal 6 and Goal 11 has 10 targets of international and national significance (Annex 1.3).

Nepal's national report on SDGs mentions national targets for basic water supply and sanitation as universal coverage by 2017 and the country require concerted effort to provide such services at least to remaining 15 % of Nepal's households (NPC, 2015). It has addressed urban poverty and calls for the implementation of disaster risk management plan in urban areas. It also calls for "substantial up-scaling of national efforts along with international technical and financial support to achieve the goals of making human settlements safe, and making housing decent, adequate and affordable" (NPC, 2015). The national report urges developed countries to provide their committed official development assistance including 0.7 % of GNI as ODA to developing countries of which 0.15 to 0.20 %% should be provided to LDCs for SDGs implementation.

By 2030, Nepal has planned to achieve the following targets under SDG 6 (Annex 1.3):

a. 95 %% households with access to piped water supply;

b. 99 % household with access to basic water supply coverage;
c. 90 % population using safe drinking water;
d. 95 % households using unshared improved sanitation facilities;
e. 98 % population using latrines; and
f. All urban households that have toilets are connected to a sewerage system.

Nepal has not set targets for untreated waste water (domestic and industrial), wastage of water and availability of fresh water.

The specific targets for SDG 11 for Nepal by 2030 include the following (Annex 1.3):

a. Reduce multi-dimensional poverty to 11 % in 2030 from 44 % (in 2014);
b. Double the proportion of households living in safe houses to 60 %;
c. Substantially reduce air pollution as low as half the concentration level of total suspended particulates (TSP) (averaging period 24 hours);
d. Prevent deaths and injuries due to disasters;
e. Repair and rebuild by 2020 all cultural heritage destroyed by the earthquakes;
f. Limit the growth of urban populations to less than 2.5 % by 2030 compared to 3.4 % in 2014;
g. Provide all municipalities with sewerage services; and
h. Encourage all private hospitals to segregate wastes.

Key issues and challenges in implementing SDGs in Nepal include: (i) mainstreaming SDGs into periodic plans and annual budgets; (ii) localising SDGs at sub-national levels; (iii) up-scaling implementation; (iv) mobilising financial resources; (v) developing capacity at the national and sub-national levels; and (vi) strengthening governance and service delivery (NPC, 2015).

Nepal is committed to fulfil SDG 11 Targets through new city planning, densification, and managed urban population growth rate (MoUD, 2016). Since Nepal set targets before the adoption of the global targets in September 2015, it has reviewed the status of SDGs (goals 1, 2, 3, 5, 9 and 17) in June 2017, and encourages the government, private sector, civil society, cooperatives and development partners to be all on board for implementing the SDGs (NPC, 2017). It further informs that sector-wide approach in water and sanitation has demonstrated better results due to resource harmonisation, and many sectoral master plans and strategies are not aligned with the SDGs. The Review urges to aligning sector plans, long-term strategies and perspective plans with SDGs, and integrating SDGs into provincial and local government plans and building capacity of the new institutions (NPC, 2017).

The Water Supply, Sanitation and Hygiene Sector Development Plan (SDP) focuses on improved access of water supply, hygiene and sanitation, urban sanitation systems (sewerage, DEWATS, storm water drainage, faecal sludge and septage management, and wastewater management (MoWSS, 2016). The SDP aims to ensure optimum utilisation of services. Within its scope, it focuses, *inter alia,* on:(i) benchmarking of systems and services; (ii) innovation and technology adoption; (iii) strategic actions on river ecosystem management; (iv) WASH governance, institutional setup and capacity building;(v) WASH diplomacy and sector convergence. The monitoring and evaluation is given adequate priority and commitment is expressed to adhere to national water and wastewater quality standards, with GESI integration, budget estimation and investment plans (MoWSS, 2016). Effective implementation of Plan supports to achieve SDG 6.

Nepal's national report to Habitat III conference underscores the importance of "ensuring sustainable access to safe drinking water, basic sanitation and drainage" (MoUD, 2016). It has outlined "plan of action" which refocus on protecting and managing water resources in a sustainable manner by reviving traditional water supply system in traditional settlements, and ensuring provision of potable water supply to all.

The national report outlines number of activities to improve access to sanitation and drainage facilities, and to promote sustainable wastewater management and solid waste practices. These activities are to, *inter alia*, improve ODF campaigns, ensure operation of all existing treatment system and faecal sludge management and add new treatment systems, promote construction of public toilets (32 in the Kathmandu Valley), provide incentives to separate grey and black water and encourage recycling and reuse of grey water at household level, promote decentralised wastewater system like constructed wetlands, and ecosan toilets in peri-urban areas and reuse treated water for recharging rivers. Similarly, it is urged to launch solid waste management projects, encourage/facilitate segregation of wastes at household level, promote the practice and operating model of 3R, allocate proper sites for transfer stations and landfill sites and manage transfer stations for waste processing and manage landfill sites for resource recovery from wastes (MoUD, 2016). These commitments sufficiently provide policy opportunities to operationalise SDGs 6 and 11 and New Urban Agenda.

1.5 Objectives and expected output of the Strategy Paper

The objectives are to: (i) assess the state of water supply and sanitation facilities in urban areas of Kathmandu Valley; (ii) identify key challenges, and explore opportunities in managing scarce water, its resources and improving sanitation facilities by addressing relevant SDGs, and New Urban Agenda; (iii) document successful interventions, gaps and needs; and (iv) propose strategic actions with provisions for capacity development, use of appropriate technologies, and possible funding sources.

The output of the study is related to: (i) knowledge generation and updates on water and sanitation facilities in urban areas of Kathmandu Valley; (ii) enhance understanding on SDGs (11 and 6) and relevant elements of the NUA; and (iii) a strategy document on water and sanitation facilities.

1.6 Methodology

The Strategy Paper has been developed by employing the following methods:

1.6.1 Literature Review: The background research on currently existing literature has been extensively conducted prior to the preparation of this Strategy Paper. This review includes published documents, reports and policy papers. Legislation, strategies and guidelines related to water supply and sanitation have also been extensively reviewed to understand the existing priorities. This reviewing process contributed to: (i)characterize the status of water and sanitation facilities in urban areas of Kathmandu Valley; (ii) describe challenges and opportunities; (iii)review relevant policies, legislations and guidelines; and (iv) identify ways to integrate water and sanitation strategies and solutions in relevant policy and legislative instruments.

1.6.2 Consultations: Consultations with experts and stakeholders from relevant government and non-governmental organisations were carried out to identify emerging issues and

understand the implementation of existing policy and legal provisions. This contributed to analyse challenges, and identify appropriate good practices and solutions.

Key stakeholders (Annex 1.4) gathered in Kathmandu on12 April 2017 to attend consultation meeting organized by ESCAP/MoUD/MoWSS/KVDA discussed the present status, priorities, and practical solutions for urban water supply and sanitation facilities in Kathmandu Valley. Participants emphasized the need to: (i) assess the state of water supply and sanitation facilities in Kathmandu Valley; (ii) identify key challenges and opportunities; and (iii) propose actions and replicable solutions for rainwater harvesting, conservation of traditional water system and groundwater, and faecal sludge management by enhancing capacities, using appropriate technologies, and mobilizing resources.

The sub-regional workshop on urban water and sanitation services in South and South-West Asia organised by ESCAP/MoUD/MoWSS/KVDA on 9-10 August 2017shared national experiences across the region, including proposed strategies and actions for Kathmandu Valley, and provided expert inputs in the draft Strategy Paper. This workshop was attended by delegates and experts of 9 countries and 70 participants (Annex 1.5).

1.6.3 The Strategy Paper: Based on the literature review and consultations, a Strategy Paper on water and sanitation in Kathmandu Valley has been finalised taking into consideration the inputs, comments and suggestions received from ESCAP, experts and multi-stakeholders during the August 2017 sub-regional workshop.

1.7 Limitations of the Study

The information of this Strategy Paper relies on the published and unpublished literatures available on the web. The publications related to supply and sanitation services of drinking water in Kathmandu Valley were thoroughly reviewed. Relevant concerns, ideas and opinions raised by the participants of the workshop were accommodated in this strategy paper. It approaches to add and strengthen appropriate practices and "uncovered" areas in the Strategy Paper in order to translate the 2030 Agenda into action.

1.8 Organisation of the Strategy Paper

The structure of this Paper is organised into five chapters. Chapter 1 introduces the issues and outlines the objectives and methodologies for the 2030 Agenda and New Urban Agenda on water and sanitation. Chapter 2 describes the state of water supply and sanitation in Kathmandu Valley. Chapter 3 reviews relevant policies, legal provisions, guidelines and roles and responsibilities of institutions, including challenges and opportunities. Chapter 4 covers goals and objectives, key strategies and priority actions. Chapter 5 discusses implementation arrangement with focus on institutions, partnership and means of implementation, including provisions for monitoring and evaluation.

Chapter Two

STATE OF URBAN WATER AND SANITATION FACILITIES IN KATHMANDU VALLEY

2.1 Promoting Water Supply and Sanitation

Nepal, the least urbanised country in South Asia, is rapidly moving towards urbanisation. Urban population has been growing at a rate of 6 % per annum since 1970. Water supply and sanitation are keys for healthy, peaceful and sustained living. Urban water and wastewater system should provide clean water for a variety of uses, remove wastewater to prevent unhygienic conditions and remove storm water to avoid damage from flooding (Hellström, Jeppsson and Kärrman, 2000). Drinking water should be treated and distributed while storm water, wastewater and sludge should be managed properly to recover any reusable products.

Water supply service level is estimated at 25 litres/person/day (minimum) for drinking, bathing, cooking/kitchen and other sanitation services in Nepal while the recommended basic requirements for human needs are 65 litres/person/day (minimum). By 2015,Nepal achieved the Millennium Development Goals (MDG) targets on basic water supply and sanitation services. To further extend the momentum, GoN aims to achieve the provision of basic facilities to all by 2017.

As of 2016, 83.6 and 81 % of the total population of Nepal has access to structures for drinking water and sanitation facilities respectively (NPC, 2017). Of them, about 50 % receive water distributed through pipes, 30 % receive water from hand pumps, and 20 % receive water from traditional sources of water like well, pond, river etc (MoHP, 2014). However, only 15 % receive medium[1]/high[2] drinking water services. The 14th Plan (2016/17 – 2018/19) has realised the need for rainwater harvesting in addition to increasing water quality, and improving and strengthening water supply system in urban and semi-urban areas. Furthermore, the GoN has emphasised to environmental sanitation, to declare the country open defecation free (ODF), and to conserve drinking water sources and to promote their appropriate uses with a view to achieve SDG 6 (NPC, 2017). The Government has planned to provide high-medium quality drinking water facilities to about 50 % of the total population by 2027.

Kathmandu Valley is a part of the middle mountain physiographic region with an area of 716 km^2 and covers the entire Kathmandu and Bhaktapur districts and close to 50 % of the Lalitpur district. A culturally rich Valley accommodates about one-fourth of the total urban population (MoUD, 2017) and contributes to about one-fourth of the national GDP.

The piped water supply system was initiated in Nepal in 1893 (some 124 years back) with few taps to Rana palaces and public places. After 80 years (in 1973), the Government established a water office (*Pani Adda/Pani Goswara*) in Kathmandu to look after the water supply system. This office was upgraded to Water Supply and Sewerage Board and then to Nepal Water Supply Corporation

[1] Medium drinking water service level ensures water quantity (65-100 lpcd), all basic personal and food hygiene, potable water meets NDWQS, all consumers having private connection (accessibility), 12 hours/day reliable water supply and service restored in one day and with 75% service satisfaction level (MoWSS, 2016)

[2] High drinking water service meets all medium service level + 100-150 lpcd, all hygiene meets, 24 hours water supply with 90% service satisfaction.

(NWSC). Previously, NWSC looked after urban water supply including that of the Kathmandu Valley. The Government established a dedicated ministry – MoWSS in 2015 and a DoWSS (established in 1972), a technical department of the Ministry to look after water supply and sanitation. For Kathmandu Valley, the Government established a dedicated Kathmandu Upatyaka Khanepani Limited (KUKL) in 2006, and KVWSMB. The KUKL made an agreement with KVWSMB in February 2008 to operate water and sewerage services in the Valley for 30 years (Rana and Shrestha, 2017) while NWSC has continued to supply water outside Kathmandu Valley.

In Kathmandu Valley, 98.1 % of the total households have access to sanitation and 99.3 % have toilets connected to the septic tanks (MoUD, 2016). However, only 30 % of the total urban population is linked to sewer lines and only 48 % of the urban population is linked to septic tanks. Sanitation could be improved through system management and technologies. In Nepal, low cost sewers, and reed bed wastewater treatment facilities are in operation (Adhikari, 2012). Municipalities are encouraging public and private sectors and community groups in providing urban services. Such partnership has been effective in launching community-based programmes and promoting environmental improvement programmes and infrastructure and service provision at the city level as reflected in Guided Land Development Projects which engage beneficiaries in planning process, land pooling, and building partnership (MoUD, 2016).

Nepal"s strong willingness to provide quality drinking water and sanitation facilities is greatly challenged by environmental impacts, climate change, population growth in addition to the increasing urbanisation and haphazard settlement growth. Inadequate sewerage networks and/or linking of sewers to holy rivers and streams, and inadequate functional and ineffective coordination amongst relevant multi-stakeholders have further compounded the challenges. Polluted water and poor sanitation has accelerated diarrhoeas, dysenteries, typhoid and paratyphoid, roundworm and hookworm etc. Poor sanitation-induced health issues continue to increase along with the associated health costs. Inadequate connection of urban households to the "limited" sewer system or to open drains has increased haphazard disposal of solid wastes. Inadequate waste collection facilities and draining of untreated liquid wastes to rivers in the Kathmandu Valley have compounded the sanitation problems. Consequently, the Government has stressed the need for managing faecal sludge and solid wastes, treating wastewater before discharge, harvesting rainwater and promoting groundwater recharge. The following sections summarises states and effects, existing programmes and initiatives on 2030 Agenda for Sustainable Development.

2.2 Existing conditions and impacts of urban water supply and sanitation facilities

Drinking Water: Access, Distribution, Sources, and Quality

72% of households in Kathmandu Valley have access to piped water while 10% of the households obtain water from other sources (MoUD, 2016). The KUKL is fully operational and yet, only supplies 120 million litres water to the demand of 375 million litres water per day (MLD). People of Kathmandu obtain water through several sources such as private well, KUKL and/or private tankers, stone spouts, public wells, bottled water dispensers, and public taps. In addition, many people depend upon bottled water dispensers, deep boring, and private wells. However, none of the respondents of the survey used rainwater harvesting (Rana and Shrestha, 2017). Majority of respondents use 5-20 m^3 of water per month. An average family consumes about 12,000 litres in

the dry season and 16,000 litres per month in the wet season. Water reuse and water conservation behavior have yet to receive necessary attention. A study carried out by the Central Bureau of Statistics showed that 59 % of the surveyed households did not have adequate piped water supply (KVDA, 2016).

Municipal water supply in Kathmandu Valley is grossly inadequate and traditional stone spouts (natural springs) are important sources for poor urban dwellers and have important aesthetic and traditional values and act as sites of cultural heritage (NGOFUWS, 2006). In Kathmandu Valley, 382 stone spouts were reported in 2006. Of them, 41 sources have dried up, 104 spouts are connected to the NWSC system, and 237 stone spouts still serve as independent water sources catering to approximately 10% of Kathmandu"s population. However, stone spouts have been drying up due to urbanisation, and few spouts have been encroached upon with the construction of new buildings, roads and other urban facilities in the recent years.

Kathmandu Valley has groundwater reserves of about 15 billion m^3 with estimated extraction of only3 billion m^3. Due to scarcity of piped water, over 400 tankers run by about 100 companies often supply groundwater to households. In addition, most of the hotels, apartments, commercial, governmental and non-governmental buildings, embassies, industries, nursing homes, and schools extract groundwater to meet their requirements. Out of about 700 deep tube wells, about 500 wells are estimated operational (GoN, 2012). In 2009, about 70 million m^3 of water was extracted from groundwater sources thereby declining the water table by up to 2.5m. This decline has also led to drying-up of 156 stone taps (from 389 to 233 stone sprouts) (although source-based number of stone spouts differs, clear message is they are drying). Furthermore, about 30 % of shallow tube wells have dried due to population increase and conversion of agriculture and/or open land into concrete buildings (GoN, 2012).

In this regard, the Melamchi Water Supply Project which was started in 2000 to supply 170 MLD of water by 2007 will most likely complete by 2017, a decade later than originally planned due to administrative and political interests, lack/inadequate funding, construction delays, site clearance and inadequate technical study of tunnel. However, an additional 2400 m tunnel is yet to be constructed as per the report from July 2017 on the status of the water supply project. During the last one and half decade, Kathmandu Valley experienced a very high rate of population growth, and as such increased water supply from private suppliers (tankers). Hence, water scarcity will likely continue to be a major problem in the Valley.

According to the WHO guidance, water requirement is 112 to 150 litres per capita per day (lpcd), however, average water supply and consumption from different sources including piped water is estimated at only 35 lcpd in the Kathmandu Valley (MoUD, 2016). This means people living in the capital obtain less than one-fourth of the total water requirement as per WHO guidance (MoWSS, 2016).

Contamination from microbes is a massive problem in the surface drinking water compared to water extracted through deep boring, although the amount of iron and ammonia might be high in the later case. One of the major causes of water pollution is related to open defecation and dumping of wastes near water sources, including leakage from drinking water and sewerage pipes. In addition, quality of the supplied water is also questionable and *E. coli* bacteria contamination is repeatedly observed in water samples, posing high risk of an epidemic of water-borne diseases.

Over 80 % of the underground water extracted and distributed from tankers in May 2015, including tap water were reported contaminated and thus poses high risk of outbreak of water-borne diseases. Furthermore, high use of chlorine in KUKL supplied water is also a challenge.(http://kathmandupost.ekantipur.com/news/2015-05-26/govt-warns-outbreak-of-water-borne-diseases.html).

Stormwater disposal

The Valley has good river drainage system with poor man-made surface drains and sewerage facilities. Landuse change (conversion of agriculture and open land into concrete buildings and roads) and encroachment of riverside public land have accelerated flood during the rainy seasons. Flood in Bagmati and its tributaries is a commonoccurrance asthe infiltration capacity of soil has declined, resulting in direct flow of large volumes of rainwater into the river. In Kathmandu Valley, stormwater drainage has been constructed for normal rainfall and does not function to the desired level during the rainy season. Intense rainfall in a short period has further damaged the drainage facilitiesand has accelerated riverbank cutting. Furthermore, blockage of stormwater drains has increased road blockage due to inundation in urban roads. In Kathmandu Valley, stormwater and riverbank flood management have been a perennial challenge.

Estimates indicate that over 400 surface drains linked with sewerage are directly connected to streams and rivers in the Valley. In order to manage wastewater, over 1190 km of sewers were constructed in Kathmandu Valley by the end of 2015. Of them, however, 79 km were found blocked. There are total of 52,171 manholes, of which 37,447 (72%)are open manholes and 14,724 (28%) manholes are closed. Of the opened manholes, 7% are blocked and non-functional (Kadel, 2017).

Wastewater collection and disposal

A similar situation exists in waste water management. Although policies on managing both urban and industrial wastewaters exist, sewerage treatment systems are severely lacking, or not functioning at the required capacity. Most of the domestic and industrial wastewater generated in cities is discharged into the Bagmati River system without any treatment (GoN/UNDP, 2013). In 2007, the total volume of domestic wastewater generated from municipalities in the Valley was estimated at 93,104 MLD, while 49,811 MLD of the total wastewater was collected. In 2015, of the 159.2 MLD of wastewater generated, only 16.2 MLD (10%) was treated by the Guheshwori wastewater treatment plant (WWTP) while the remaining 143 MLD (90%) of wastewater was directly discharged into the Bagmati River system. Direct discharge into the river has increased the load of both biological and chemical pollutants, degrading water quality and eroding its aesthetic values (GoN and NTNC, 2009). As a result, the Bagmati River system in its lower stretch is “biologically dead” as useful aquatic species have not been recorded due to the high level of pollution. Poor drainage adds to the problem of direct discharge into the low-lying areas of the Kathmandu Valley such as Putalisadak and Tinkune. Even surface drainage systems have been developed without adequate consideration of rainfall patterns, and extreme weather events. By 2030, wastewater might reach nearly 500 MLD and its management will be an even bigger challenge due to the lack of comprehensive master planning, policy-making and tariff setting for sanitation (Kadel, 2017).

Decentralised wastewater treatment options are typically adapted in urban and peri-urban low income areas where access to centralised sewer and wastewater treatment system is limited (MoWSS, 2016). Water systems are dysfunctional due to inadequate application of water safety pipelines, and limited institutional, technical and financial capacity of user committees to repair systems.

Five municipal wastewater treatment plants (WWTPs) – an activated sludge plant at Guheshwori, non-aerated lagoons at Kodku and Dhobighat, and aerated lagoons at Sallaghari and Khokana - have been established in Kathmandu Valley. However, only the first treatment plant is functional at present. In order to minimise discharge of untreated wastewater into Bagmati River, the Bagmati Action Plan (BAP) has proposed to: (i) promote rainwater harvesting at household and community level; (ii) rehabilitate ponds to recharge groundwater through rainwater harvesting; (iii) promote on-site sanitation with best available approaches such as ecosan, bio-gas, safety tank etc.; and (iv) construct community managed DEWATS (Decentralized Wastewater Treatment Systems) in public and private institutions such as army and police barracks, government offices, schools, colleges, housing colonies, monasteries, industries and other public places (GoN and NTNC, 2009). The DEWATS is considered appropriate for small settlements that generate about 1000 m^3wastewater per day. A small plant, installed for 250 households at Thimi, is operational. It uses reed bed technology to manage wastewater at the local level (GoN and NTNC, 2009).

The DEWATS – a low maintenance treatment system, treating small volumes of wastewater for reuse or discharge within National Standards – treats domestic wastewater of individuals or groups of dwellings or institutions. In Nepal, this system is popular as hospitals, academic institutions, private house and housing complex have been benefitting from DEWATS for nearly 2 decades. Out of 67 DEWATS constructed in Nepal by 2016, about 52 % (35 DEWATS) are in Kathmandu Valley (Shrestha, 2017). However, only 53 %of the DEWATS are properly used and maintained while 24 % are not in use at all. It is considered that DEWATS could be a good solution for institutions, peri-urban and new urban areas.

On sanitation, almost all households have toilet and sewerage facilities. Some of the households have septic tanks. In Kathmandu Valley, 98.1 % of the total households have access to sanitation, and 99.3 % have toilets (MoUD, 2016). Sanitation is comparatively poor and inadequate in areas occupied by marginalised communities, in schools, and other public places.

Faecal sludge management

After taking existing human population, septic tanks and toilets into account, over 2.2 million people have unregulated faecal sludge in urban areas which calls for an investment in faecal sludge management, to complement the development of sewerage systems (Sharma, 2017). Faecal sludge pollutes surface and groundwater, accelerates water-borne and poor sanitation-induced (pathogens) diseases, and generates unpleasant odours. No practice is in place to empty pits at regular periodic intervals. Once toilets start overflowing, faecal sludge is collected either by a public agency or a private company, or an individual entrepreneur, engaged in faecal sludge collection and disposal (Sharma, 2017). Nepal is yet to establish a practice of treating or properly disposing the faecal sludge. Faecal sludge collected by individuals may be dumped or discharged through sewerage pipelines and drainage channels, or sold to farmers. Nepal is yet to adopt treatment systems or an operational procedure for collection, treatment, safe disposal, and reuse of

faecal sludge. This includes periodic desludging of pits and septic tanks, increasing facilities for suction vehicles, and developing proper disposal sites.

Solid waste management and waste segregation

Over 60% of solid waste generated in the Valley is dumped on the road or riverside areas. However, one-third (450 tons) of the total waste generated (1225 tons) is collected for recycling (KVDA, 2016). Haphazard disposal of mixed solid wastes is increasingly becoming an issue in the Valley. Although, responsibilities for municipal solid waste management lies with the Solid Waste Management Technical Support Centre, and respective municipalities, the critical issues on solid waste management are: (i) open dumping; (ii) low level of coordination between the Centre and municipalities; (iii) lack of waste segregation and recycling practices; and (iv) increasing amount of non-biodegradable plastic materials in the wastes (in spite of ban on use of less than 20 micron plastic bags) and electronic and medical wastes (KVDA, 2016).

Human health is adversely impacted from inadequate solid waste management through disease outbreaks (food, water and vector-borne), persistent diseases (diarrhoeal) and non-communicable diseases (from industrial wastes). There is no segregation practice for domestic and industrial wastes. Both solids and liquid wastes from industries and domestic sources are directly connected to the storm water drains (MoUD, 2016). In order to improve sanitation conditions, reduce exposure to diseases, and minimise health problems, there is an urgent need for sanitation planning to assess and manage risks through a comprehensive risk assessment and risk management tool.

A study in Kathmandu Valley on urban water demand management through pricing and non-pricing policies revealed that people are "willing to pay extra money" for better water services (Rana and Shrestha, 2017).

The 2015 Nepal earthquake damaged water and sanitation facilities in Kathmandu Valley. Damage of the Kathmandu Metropolitan City, Bagh Durbar alone costs NRs. 213 million from earthquake. Similarly, damage cost of the Office of the Prime Minister and the Council of Ministers was estimated NRs. 850 million. The total damages to all buildings inside Kathmandu Valley are estimated at NRs. 18 billion. Handling of damage-induced construction wastes is an increasing threat to manage solid wastes.

When national goal of making Nepal Open Defecation Free (ODF) zone was announced in 2011, Kathmandu district had toilet coverage of nearly 94 %. Kathmandu Metropolitan City and 4 other municipalities (Shankarpur, Kageshwori Manahara, Gokarneshwor and Dakshinkali) of Kathmandu district have failed to make significant progress. Bhaktapur is the first ODF district in Kathmandu Valley declared in 2013. Kathmandu , as a whole, is yet to achieve one toilet per household, including in the metropolis.

In Kathmandu Valley, about one-third of the water samples of deep tube wells and 44 % of shallow tube wells were found contaminated with coliform and non-compliant with the National Drinking Water Quality Standards (2006). In a nutshell, major issues on water supply in the Kathmandu Valley are related to: (i) insufficient supply of water with respect to the increasing demand; (ii) unsatisfactory water quality; (iii) depletion of groundwater table and other sources; (iv) delayed implementation of drinking water projects mainly Melamchi Water Supply Project; (v) unregulated groundwater extraction and lack of recharging options, and rainwater collection; and

(vi) overlapping on institutional roles and responsibilities (KVDA, 2016)and "culture of shifting responsibility".

2.3 Existing programmes, activities and achievements

The Kathmandu Valley Development Plan prepared in 1972 recommended that settlements should be developed in the dry land area (non-irrigated *tar*), while wetlands should be maintained as per the geographical structure of the Valley. The Land Use Plan of Kathmandu Valley (1976) gave birth to the Kathmandu Valley Town Development Committee to enforce the Plan. Ineffective implementation of the plans increased pollution load. In 1986, a study on Kathmandu Valley Urban Land Policy was carried out to understand and guide land use and ownership. In 1991, Kathmandu Valley Urban Development Plan and Programme was prepared which recommended the Kathmandu Valley to establish and develop as a primary administrative, cultural, tourism, and ancient monuments conservation centre. The Plan proposed to restrict development in wetland and riversides, and conserve Phulchoki and Chandragiri watersheds as wildlife reserves (KVDA, 2016). Partial implementation of this plan could not regulate urban development sustainably. In 1999, a study was conducted to develop an environmental plan for Kathmandu Valley that identified population growth, loss of agricultural land, location of industries and institutional setup as well as weak implementation of policies and plans as the key reasons for ecological degradation and water supply and sanitation issues. The environmental planning and management of the Kathmandu Valley proposed, *inter alia*, to develop land use plan, declare Kathmandu Valley as a cultural and tourist capital, and restrict development in high agriculture potential areas, river bank, slopes, and environmentally sensitive areas. It recommended the establishment of "eco-towns", merging urbanising VDCs, and re-defining urban boundaries, including development of a master plan for sewerage network (MoPE/IUCN, 1999).

The Long-term Development Concept Plan (LTDP) of Kathmandu Valley (2002) proposed promotion of the Valley as a historical, cultural, and tourist capital of the country. It strategized to decentralisation of the economic opportunities and capital investments to other potential regions (to relocate the polluting industries like cement, brick and carpet industries) outside the Valley, and identified potential expansion areas for increasing populations based on carrying capacity (KVDA, 2016). This LTDP identified Harisiddhi Town Development Programme, conservation of rivers leading to the preparation of the Bagmati Action Plan, conservation of forests and watersheds (no specific project developed), Melamchi Water Supply Project which is under construction, conservation of cultural heritage and historic settlements (Kathmandu Sustainable Urban Transport Project partially focus in protecting tourist areas), and improvement and extension of Ring Road and Highways for the development and conservation of cultural, religious and tourist areas. This Plan has also proposed wastewater management whereby domestic wastewater will be collected and conveyed through the trunk sewers for treatment before discharging to the river system. It calls for prohibiting direct discharge to the rivers. However, this programme has not been implemented to the desired extent.

Inadequate and ineffective implementation of these plans and programmes resulted in the current state of the Valley in terms of congestion, inadequate water supply, sanitation facilities and pollutant loading. The decade-long political disturbance in the country (1995-2005) accelerated internal migration to Kathmandu Valley, primarily due to security reasons and centralised social service facilities such as health and education. The Valley experienced a tremendous urban growth

initially within the Ring Road area and converted agricultural land into urban settlements. This also accelerated unregulated and haphazard settlements outside Ring Road and foot hills.

KVDA has drafted the Vision 2035 and Beyond: 20 Years Strategic Development Master Plan (SDMP, 2015-2035) which has a target to provide 100 % access to piped water supply (100 lpcd) with public taps in urban areas (KVDA, 2016). In order to meet its twin objectives of expediting water supply projects, and strengthening water supply system, SDMP has proposed to: (i) prepare and implement water recharge plans by protecting water recharge areas; (ii) improve bulk distribution system and distribution network by 2020; (iii) strengthen non-revenue water management to control water leakages and illegal connections and improve the revenue and return on investment for Kathmandu Valley water utilities; and (iv) develop and implement stringent policies to prohibit excessive groundwater extraction. The proposed actions will be implemented by the Project Implementation Directorate (PID), and KUKL with support from municipalities, KVDA and relevant agencies (KDVA, 2016).

Regarding sanitation, SDMP aims to coordinate development of wastewater treatment systems, and promote wastewater treatment in institutional buildings. SDMP emphasises integrated solid wastes management which includes the disposal of medical wastes, e-wastes, debris/construction wastes, and community-based waste management. Development of local level plans for each municipality will contribute to regulate and upgrade current practices of wastes collection and management, including development, upgrade and operation of sanitary landfill site for a municipality or cluster of municipalities, develop and implement programmes to segregate wastes at the source, and allocate land areas for management of municipal solid wastes, e-waste and medical wastes. In addition, SDMP recommends establishing a research centre for effective management of e-wastes, introducing EPR (Extended Producers" Responsibilities), providing technical resources for debris management, and conducting awareness campaigns to promote community-based waste management.

Approval of Kathmandu Valley Water and Sanitation Sector Policy and Kathmandu Valley Water Supply and Sanitation Sector Strategy in 2000 facilitated the implementation of Melamchi Water Supply Project with assistance from the Asian Development Bank (ADB). The Project implementation was expedited after the approval of Urban Water Supply and Sanitation Policy in 2009. As of July 2017, about 24.3 km of tunnel is still under construction, and it is expected that Melamchi water will be supplied by 2017.

The Kathmandu Valley Wastewater Management Project aims to develop wastewater infrastructure to improve the overall environment of Kathmandu Valley, including improvement of water quality in the rivers. The objectives are to: (i) improve wastewater management capacity; (ii) maximise efficiency and effectiveness of existing sewerage systems and service provision; (iii) strengthen sewerage infrastructure to end contamination of drinking water pipelines through wastewater leakages; and (iv) improve water quality in urban rivers, tributaries, and their ecosystems.

A number of projects are under implementation in Kathmandu Valley to improve water supply and sanitation services, including related reforms and institutional strengthening (Annex 2.1). In spite of several initiatives to provide, improve and upgrade water supply and sanitation facilities in the capital city, inhabitants of Kathmandu Valley are continuously affected by water-borne and

poor sanitation-related diseases. Drinking water and sanitation is expected to be a perennial problem until the Melamchi Project is completed. Water supply is inadequate, and quality of tanker water is questionable. Waste management practice is limited to household level and public places face on-site and off-site waste problems. Wastewater treatment facilities are mostly non-functional. Need for pollution control activities have been realised, however, design and implementation is deficient.

Four and half-decades of formulating Plans has not been productive and effective in handling water and sanitation issues in Kathmandu Valley. A number of Plans were revised or re-developed without implementation due to changes in political and administrative leadership. Such changes have become a "culture" or a "proven approach of shifting responsibility" for "inaction". Lack of achievement in desired outcomes is also related to overlapping functions, responsibilities and strategies of the relevant institutions. Site-specific action plansfollow sector approach on planning and implementation although policy focus is on integration.

A number of practices have been implemented to access funding and generate and mobilise domestic resources to address the on-going and emerging threats on water supply and sanitation (Annex 2.2).

Chapter Three

POLICIES, LAWS AND INSTITUTIONAL ARRANGEMENT

In Nepal, policies[3], plans, strategies, programmes, standards and guidelines are formulated by the concerned ministries as per the roles and responsibilities mentioned in the Business Allocation Rules, and they are approved by the Council of Ministers (Cabinet) for implementation. The National Planning Commission formulates cross-sectoral policies and coordinates planning processes. New organisations are established after the approval of the Cabinet. However, the Bill tabled by the Government should be approved by the Legislature Parliament to make it an Act. In order to implement the legislation effectively, Rules (Regulations) and bye-laws are prepared and approved by the Cabinet. In this context, policies, plans, programmes and guidelines are "facilitative instruments" while laws (Act and Rules) are legally binding. Standards and guidelines are also prepared and implemented based on legal provisions and/or issued after the Cabinet decision. This chapter summarises relevant recent policies, plans and standards formulated and implemented and laws enacted and enforced to promote water supply and sanitation activities in Nepal.

3.1 Relevant policies, strategies and plans

In budget speech for fiscal year 2017/2018, annual investment on water supply and sanitation is prioritised to ensure basic drinking water supply within two years to remaining 13 % of the total population. The Government has declared to observe the fiscal year as "water supply and sanitation campaign year" and develop sector plan to meet SDG (6) on water and sanitation. The Government, through its budget speech, has committed to enact integrated water supply and sanitation legislation, and formulate and implement drinking water security plan.

In general, three approaches are adopted in Nepal to address particular issues through policies and programmes. They are: (i) budget speech where budget is allocated to specific activity; (ii) periodic plan which focuses on time-bound policies, strategies, programmes and activities with estimated budget and priority of the Government; and (iii) sector-specific policy or strategy or plan or programme for longer-term period. This review documents key policies, strategies and plans to have better idea on "previous emphasis" and devise new strategies to address existing problems and emerging threats on water supply and sanitation (Annex 3.1).

The Fourteenth Plan (2016/17-2018/19) aims to provide basic drinking water and sanitation services to all, and expand medium and high quality services in this Plan period. The three-year Plan commits to: (i) implement "one house one toilet policy" and construct public toilet in public places; (ii) promote rainwater collection and use, regulate groundwater abstraction, and promote DEWATS; (iii) implement drinking water and sewerage-related projects in urban areas; and (iv)

[3]In general understanding, a policy is a set of purposive actions of the government or political actor or group of actors or other organisations with means of achieving them within a specified time. The plan is a set of actions intended (expected) to do or achieve something in a planned way. The programme is a plan of action aimed at accomplishing an objective with details on what work is to be done, by whom, when, and what means or resources will be used. The strategy provides a clear pathway to reach the destination. A policy opens avenues to formulate a plan or a strategy. Policies are normally revised after 8-10 years or once "facilitative instruments" fail to deliver or there is an urgency to address new issues and concerns.

continue sewerage management project in Kathmandu Valley, and construct and operate sanitary wastewater and treatment system to make the Bagmati River sewer free (NPC, 2017).

The 2017 National Urban Development Strategy addresses matters related to systems, infrastructure, environment and economic issues and calls for an integrated approach to manage sewers and sanitation facilities (Annex 3.1). The Strategy outlines 5 to 15-year milestones for improved infrastructure, healthy environments, efficient management, and vibrant economies (MoUD, 2017). This Strategy identifies key issues and proposed several strategies related to water security, safety, sanitation, solid waste collection, reduce, reuse and recycle along with resource generation and mobilisation to address water supply and sanitation challenges in urban areas.

Key Policies and Strategies

- National Urban Development Strategy, 2017
- Kathmandu Valley Strategic Development Master Plan (draft), 2016
- National Urban Water Supply and Sanitation Policy, 2014
- Groundwater Resource Management Policy, 2012
- Revised National Shelter Policy, 2012
- Sanitation and Hygiene Master Plan, 2011
- Urban Water Supply and Sanitation Policy, 2009
- National Urban Policy, 2007
- Nepal Water Plan, 2005
- Water Supply Sector Policy, 1998
- National Solid Waste Management Policy, 1996

KVDA, in its draft *Vision 2035 and beyond: 20 years strategic development master plan (2015-2035) for Kathmandu Valley*, has expressed to *make Kathmandu Valley a safe, clean, organised, prosperous and elegant (SCOPE) national capital*. This draft Master Plan has emphasized the need for developing integrated and quality drinking water and on-site and off-site sanitation services through public-private partnerships. It calls for improving wastewater management capacity, maximising efficiency and effectiveness of existing sewer systems, strengthening sewerage infrastructure and services, preventing drinking water pollution, and improving river water quality (KVDA, 2015; Annex 3.1).

The 15-year Water Supply, Sanitation and Hygiene SDP (2016-2030) focuses to deliver WASH services effectively and efficiently with a vision of "improving public health and living standard of people though safe, sufficient, accessible, acceptable and affordable water, sanitation and hygiene services – any time, everyone and everywhere" (MoWSS, 2016). Its objectives are to: (i) provide basic water and sanitation facilities for all; (ii) address all sector issues and future developments; (iii) articulate sector priorities, strategies and actions; (iv) guide and align all actors for effective programming and management; and (v) put in place policy, legislative and regulatory framework, a clear institutional framework for service delivery, It ensures to align with SDGs (Annex 3.1).

The Sanitation and Hygiene Master Plan (2011) aims to achieve national toilet coverage by 2017, and refocuses on open defecation free (ODF), access to sanitation, technology choices, local leadership, locally managed financial support mechanism and mandatory provision of properly designed toilets and sanitary systems (GoN, 2011). It highlights number of operational strategies such as participatory planning, inclusive, gender-sensitive and sustainable hygiene and sanitation and encourages municipalities to identify and implement parameters and indicators, including post-ODF to achieve total sanitation situation.

The National Urban Water Supply and Sanitation Policy (2014) adopted a goal of ensuring socio-economic development, improving health status and quality of life of urban population. The Policy targets the poor and marginalised for sustainable water supply and sanitation services and protection of the environment.

In addition, the Groundwater Resource Management Policy (2012), Groundwater Extraction and Utilisation Permit Guidelines (2014), Total Sanitation Guidelines (2017) and Institutional and Regulatory Framework on Faecal Sludge Management (2017) provides opportunities for sustainable use of groundwater resources, promote sanitation, and faecal sludge management through collaborative efforts (Annex 3.1).

Key Guidelines and Framework

- Total Sanitation Guidelines, 2017
- Institutional and Regulatory Framework on Faecal Sludge Management, 2017
- Groundwater Extraction and Utilisation permit Guidelines, 2014
- Urban Environment Management Guidelines, 2012
- Water Supply Service Operation Guidelines, 2012
- Water Supply and Sanitation Co-investment Project Implementation Guidelines, 2011
- Sustainable Development Agenda for Nepal, 2003

During the last two decades, focus on human settlement and shelter policy has shifted from "housing for all" in 1996 to "cities for all" in 2016 to make the communities resilient. The National Urban Policy (2007) accorded priority for regional investment, utilisation of local resources, compacting settlement and building institutional capacity while NUDS in 2017 approached urban development in 4 thematic sectors (urban system, infrastructure, economy and environment) with 4 mechanisms namely urban governance, land, investment and finance with the guiding principles of sustainability, resilience, efficiency (in service delivery), green (asset and technology) and inclusivity (Mainalee, 2017).

3.2 Laws, standards and guidelines

The Constitution of Nepal (2015) has provisions for fundamental right to "live in a clean and healthy environment" and "obtain compensation … for any injury caused from environmental pollution" (Article 30). The right to health and access to clean drinking water and sanitation is also a fundamental constitutional right (Article 35). Powers related to conservation and multiple uses of water resources, human settlement development policies and environmental adaptation rest with the Federal government. In the context of water and sanitation, Province has necessary power on State level "water supply services", use of water and environmental management within the State (Table 3.1). The Local Level (District Development Committee, Municipality and Rural Municipality) has necessary "power" on water supply, watershed protection, and disaster management (NLC, 2015).

As water and sanitation is the fundamental right of the citizen, the right to water and sanitation includes: (i) provision for sufficient water with continuous supply for personal and domestic uses; (ii) clean and safe water; (iii) accessible water and sanitation services and facilities; (iv) affordable water and sanitation services; (v) non-discrimination and inclusion of vulnerable and marginalised groups; (vi) access to information and participation; and (vii) accountability (Adhikari, 2012).

Table 3.1: **Provision of WASH services in the Constitution of Nepal**

SN	Articles & Schedules	Provisions
1	Article 30 (1)	Every citizen shall have the right to live in a clean and healthy environment.
2	Article (30 (2)	Victim of environmental pollution or degradation shall be entitled the right to compensation from the polluter as provided in the law.
3	Article 35 (4)	Every citizen shall have the right to access to basic clean drinking water and sanitation services.
4	Article 56 (2)	The exercise of Nepal"s State power shall be used by Federations, States and Local units as mentioned in the Constitution.
5	***Schedule 5: List of Federal Power***	
5.1	No. 11	Policies relating to conservation and multiple uses of water resources
5,2	No. 14	Central level large electricity, irrigation and other projects
5,3	No. 35	Any matter not enumerated in the Lists of Federal Powers, State Powers and Local Level Powers or in the Concurrent List and any matter not specified in this Constitution and in the Federal laws
6	***Schedule 6: List of State Power***	
6.1	No. 7	State level electricity, irrigation and water supply service, Navigation
6.2	No. 19	Use of forests and waters and management of environment within the State
7	***Schedule 7: List of Concurrent Powers of Federation and State***	
7.1	No. 18	Tourism, water supply and sanitation
8	***Schedule 8: List of Local Level Power***	
8.1	No. 7	Local level development plans and projects
8.2	No. 9	Basic health and sanitation
8.3	No. 19	Water supply, small hydropower projects, alternative energy
9	***Schedule 9: List of Concurrent Powers of Federation, State and Local Level***	
9.1	No. 5	Services such as electricity, water supply, irrigation
9.2	No. 14	Royalty from natural resources

Source: Constitution of Nepal, 2015

Based on the Constitution of Nepal, GoN has elaborated functions and responsibilities of the Local Level on basic health and sanitation. Local Level is empowered to formulate, implement and regulate water supply and sanitation related policies, laws and standards. Local Level is made responsible to provide safe drinking water and quality (healthy) foods, control air and noise pollution, and launch awareness activities to improve sanitation and manage wastes, including use of 3R approach to improve health condition of the people. Local Level is also responsible to fix and collect water tax and activities related to drinking water service management, including preparation of a profile of natural resources. The functions and duties of municipalities in the draft Local Governance Bill, 2017 provides similar roles and responsibilities as mentioned above. In a nutshell, municipalities have exclusive functions on water supply and sanitation services.

Article 97 of the Constitution of Nepal (2015) mandates the provisions to form committees. Thematic committees have been established as per the Legislative-Parliament Rule (2016) to monitor and evaluate the works of the Government and issue necessary directives and suggestions.

The Environment Protection Committee looks after water and sanitation issues, or works of the Ministries of Water Supply and Sanitation, Population and Environment, Forests and Soil Conservation, and Urban Development. Municipalities will contact the Government through the Ministry of Federal Affairs and Local Development (MoFALD). However, the Parliamentary Committee on Development looks after the work of MoFALD. Therefore, Parliamentary Committees have the necessary rights and responsibilities to instruct and issue directives, as necessary, to provide quality and safe water supply and sanitation facilities in Kathmandu Valley.

The Nepal Water Supply Corporation Act (2007 with its amendments), Water Supply Management Board Act (2006), and Water Supply Tariff Fixation Commission Act (2006) mandate provisions to improve water and sanitation services in Kathmandu Valley. The Water Supply Tariff Fixation Commission Act (2006) may constitute a Commission and authorises it to fix tariffs that service providers charge.

The Water Supply Management Board Act (2006) mandates provision to constitute an autonomous Board to regulate, manage, maintain quality and provide safe drinking water and sanitation services in municipalities. As per this Act, the Kathmandu Valley Water Supply Management Board has been established to supply water regularly in a managed and effective manner in municipalities of the Kathmandu Valley (Annex 3.2). Other relevant legislations are Water Tax Act (1966), Water Resources Act (1992), and Local Self-Governance Act (1998).

Key Legislations

- Constitution of Nepal, 2015
- Nepal Water Supply Corporation Act, 2007
- Water Supply Management Board Act, 2006
- Local Self-Governance Act, 1999
- Town Development Fund Act, 1997
- Kathmandu Valley Development Authority Act, 1988
- Town Development Act, 1988
- Water Tax Act, 1966

The Town Development Fund Act (1997) states the provision of financial and technical support to municipalities undertaking development programmes and projects. The KVDA Act (1988) has provisioned KVDA to function as an umbrella planning body in Kathmandu Valley. The Environment Protection Act (1996) and Local Self-Governance Act (1998) have provisions, for water conservation and sanitation improvement, development of sewer system, collection, disposal and management of wastes. The National Building Construction Code (2003) provides guidance to manage household wastes and wastewater, rainwater collection, toilet construction and other sanitation services in the urban areas. The Government has issued National Drinking Water Quality Standards (NDWQS 2005). The water suppliers are required to test drinking water regularly and maintain the quality as per NDWQS, and conduct quality assurance of distributed water (MoHP, 2014).

In 2014, the Parliamentary Committee on Environment Protection issued a Directive to improve urban environmental condition. The directive includes, *inter alia*, segregation of wastes, composting of biodegradable wastes, avoidance of human settlements around drinking water sources and conservation of such sources, development of Kathmandu Valley as a single unit for sustained development, arrangement of public toilets with water and sewer, prohibition of dozers in surrounding hills, and management of drainage and septic tanks. The Directive urges to ensure water and sewer line before constructing private building and reduce pollutants-induced diseases.

In 2015, MoUD suggested the Parliamentary Committee on Environment Protection to, *inter alia*, avoid human settlements around drinking water sources, and consider Kathmandu Valley as one planning unit to promote integrated infrastructure planning along with public toilets and greenery.

The Government has issued three directives on WasSan (co-financing, project implementation in dry area, and service operators) in 2012 to improve the level of services in emerging towns. These legal instruments, codes, directives and guidelines provide multiple avenues to enhance water supply and sanitation services in Kathmandu Valley.

3.3 Key institutions

3.3.1 Central level institutions

The Business Allocation Rules of Nepal (2015)states the actions on working areas of government ministries, including Office of the Prime Minister and Council of Ministers. The GoN has established a dedicated Ministry of Water Supply and Sanitation on 24 December 2015. This Ministry has the responsibility of formulating, implementing, monitoring, regulating and evaluating policy, plan and programme related to drinking water, sanitation and sewerage which contributes to SDG 6 targets (GoN, 2015). It provides guidance to KVDA, KVWSMB, KUKL, Kathmandu Valley Water Supply and Sanitation Project Implementation Directorate, Nepal Water Supply Corporation, Melamchi Drinking Water Development Committee and Melamchi Drinking Water Project and other similar projects, including Drinking Water and Tariff Fixing Commission (Annex 3.3).

Key Institutions

- Ministry of Water Supply and Sanitation
- Ministry of Urban Development
- Ministry of Federal Affairs and Local Development
- Ministry of Health
- Ministry of Population and Environment
- Department of Water Supply and Sewerage
- Department of Urban Development and Building Construction
- Department of Health Services
- Department of Environment
- Kathmandu Valley Development Authority
- Kathmandu Valley Water Supply Management Board
- Kathmandu Upatyaka Khanepani Limited
- High Powered Committee for Integrated Development of Bagmati Civilisation
- Project Implementation Directorate

MoWSS has a long-dedicated body, Department of Water Supply and Sewerage, established 45 years ago in 1972 for drinking water supply and sanitation facilities.

The Ministry of Urban Development is responsible to formulate, implement, monitor, regulate and evaluate policy, plan and programme related to urban development, urban infrastructure, including physical planning, coordination, monitoring and evaluation of municipalities that contributes to attain SDG 11 (GoN, 2015). The KVDA contacts the Government through MoUD. The Department of Urban Development and Building Construction (DoUDBC) is engaged in implementing water supply, sewerage and drainage infrastructures.

A number of other ministries, departments and independent organisations are directly or indirectly engaged in water supply and sanitation, surveillance, compliance and impact monitoring or standard setting or implementing development activities (Annex 3.3).

3.3.2 Organisations for the Valley

Four Valley focussed institutions (KVDA, KVWSMB, KUKL and HPCIDBC) implement water and sanitation-related programmes and activities. KVDA functions as a planner, developer, coordinator, and as a regulatory, controlling and prohibitary organisation. The Government has established the KVWSMB to provide regularly water supply and sewerage services to people of Kathmandu Valley by formulating necessary policies and rules on surface and groundwater sources. The Government has also established KUKL in 2006 as a public company and operates under the Public-Private-Partnership (PPP) modality (http://kathmanduwater.org/). KUKL manages water supply and sanitation system, including wastewater services of the Kathmandu Valley under a License and Lease Agreement with KVWSMB for 30 years. HPCIDBC is mandated to construct: (i) trunk sewer pipeline along both the banks of river; (ii) secondary sewer pipelines; (iii) wastewater treatment plants; (iv) river training works; (v) roads and greenbelts along the river banks, and (vi) launch public awareness programmes.

3.3.3 Municipalities

Article 214 of the Constitution of Nepal (2015) provides executive functions of the Municipality that includes the issuance of general directives, controlling and regulating the governance of the Municipality (NLC, 2015). The Constitution orders a provision of Local Consolidated Fund in each Municipality that contains all revenues and grants received, loans raised by Municipality and amounts received from other sources. The Schedules 8 and 9 of the Constitution list power of municipality to act on local taxes, manage local services, implement development plans and projects on basic health and sanitation, and manage disasters. The concurrent powers of Federation, State and Local Level (also Municipality) are also on health, water supply services, service fee, charge, penalty and royalty from natural resources, water uses, environment, ecology and biodiversity, including disaster management (Table 3.1).

In early 2017, the Government elaborated Local Level powers. Municipality enjoys and exercises powers related to formulation and implementation of policy, law, standard, and plan on basic health and sanitation, improvement of safe drinking water, and control of air and noise pollution, awareness on sanitation and health-related waste management, fixing and regulating service fee and collection, reuse, treatment and disposal, and provide urban health services. The Constitution has provisions for mitigating environmental disasters; controlling pollution; and managing hazardous and other wastes. It includes provisions to formulate and implement drinking water policies, laws, standards and plans, including management of drinking water fees and services. In May 2017, the Government (cabinet decision) issued the Service Operation and Management Order to provide services to the local level with broad-based general guidance till the Local Government Act is in place.

The Local Level is empowered to examine the design of field level sanitation systems (toilet, septic tank, soakpit) and discharge sites of faecal sludge in new and existing constructions. The Local Level is also empowered to supervise proper discharge of domestic and industrial sewage.

A number of NGOs such as FEDWASUN and MuAN and CBOs are engaged in providing water supply and sanitation services in urban areas. Similarly, private sector is engaged in providing tanker water services. A number of development agencies are supporting Nepal, including Kathmandu Valley, in expanding water and sanitation services.

3.3.4 Coordination mechanism

The 2011 Sanitation and Hygiene Master Plan and existing policies and frameworks propose coordinating committees at various levels such as National Sanitation and Hygiene Steering Committee to Municipality Level Water, Hygiene and Sanitation Coordination Committee for planning, implementation, monitoring and supervision of sanitation and hygiene promotional activities (GoN, 2011; Annex 3.4). Mayor chairs the Municipality Level Committee. The roles and responsibilities of the Committee are to prepare and update WASH profile of the Municipality, analyse sanitation and hygiene issues and strategies, and conduct resource mapping and stakeholder analysis and prepare a joint plan of action and organise innovative and creative activities as appropriate.

3.4 Challenges and Opportunities

A number of periodic plans and annual programmes are currently in place. However, one of the urgent challenges is the rapid development of urban area without adequate planning to mitigate hazardous risks. Target monitoring activity indicates the cases of implemented plans to some degrees, although the performance results monitoring are not satisfactory.

Most of the urban areas have low densities, creating difficulty in providing urban services and per capita investment costs for water and sanitation services are high in comparison to the planned city. In Kathmandu Valley, roads were developed after construction of buildings. Drinking water, sewers and drainage infrastructures were constructed after reasonable growth on the number of houses and building. Design of previous drinking water, sewers and drainage facilities were for small population as per urban plans of early 1980s or 1990s. Thirty years back, planners could not capture possible effect of "forced migration or displaced populations" due to decade long "Maoist insurgency" and capital-centric development.

Increase in drying-up of water sources has challenged implementation of "one house one tap" policy. Furthermore, increasing number of taps in private buildings instead of "public taps" as per SDGs requirement has increased water demand and accelerated pressure on water sources (MoWSS and MoFALD, 2016).

The key challenges are due to insufficient water supply, unsatisfactory water quality, excessive groundwater extraction, low groundwater recharge and rainwater harvesting practices, inadequate and non-functional sewers, and inadequate coordination (KVDA, 2016). Additional stresses on water supply and sanitation in the Valley are due to:

1. increasing urbanization and unmanaged settlements;
2. population pressure and decline in water sources and increase in pollution level;
3. gap between water demand and supply; and
4. leakage from century old and poor piping and distribution networks;

Current trend on "shifting of responsibilities" and "inaction" has compounded the challenges to smoothly provide quality water supply services. Drying-up of traditional ponds and water sources

and unmanaged open spaces for "water retention" has increased pressure on WASH sector. Furthermore, decrease in number of rainy days without change in quantity of rainwater and increase in flash floods associated with rise in average annual temperature has added problems in providing services on fundamental rights of the people on water and sanitation.

Low or no response from local authorities during political instability and frequent transfer of executives of the municipalities is also a challenge to continue on-going initiatives and/or take new initiatives on water and sanitation facilities and services. Minimum bare need per capita water needed as per WHO guidance has not been provided. The key challenge lies in providing better services and improving efficiency of services in Kathmandu Valley.

Although internationally agreed in providing universal access to basic sanitation and drainage facilities and wastewater treatment, huge investment is required to provide quality services. Development of infrastructure for drainage and wastewater treatment facilities also requires a system for regular repair and maintenance.

Challenges of non-implementation of policy and programme commitments are partially related to low level of understanding on the benefits of improved sanitation and hygiene (investment of $1 provides benefits of $7), increased number of poor people, difficulty in allocating fund for toilets and sewer system, inadequate mainstreaming of hygiene and sanitation component in annual programmes and/or non-allocation of required funds. Implementation challenges are also pronounced in the Kathmandu Valley. Amount of water supplied and its quality is always a challenge. Urban sanitation is increasingly becoming complex due to inadequate use of technologies and financing.

Inadequate implementation of previous policies and plans and enforcement of legal provisions has limited improvement of quality sanitation facilities and also limited an approach of "changing gear and direction" through performance monitoring, This non-compliance is also related to allocation of only about 5 % of the budget in spite of policy commitment for financing in sanitation up to 20 % budget of water supply and sanitation sector budget.

Additional challenges are related to access, functionality and sustainability of water services, fragmented institutional setup, project-driven modalities, inadequate sector financing, and intermittent water supply of poor quality, as major challenges the water and sanitation sector is experiencing over the years (MoWSS, 2016).

Coordination has been a perennial challenge in Nepal. An institution or a person wants to coordinate others but does not want to be "coordinated by others". This "supremacy syndrome" or "unwillingness to cooperate" has greatly affected cooperation and collaboration between and among organisations. Hence the challenge is "how to enhance the effectiveness of coordination between the agencies concerned with water resources". Unsystematic urbanisation, and expansion of settlements without access to minimal services calls for making drinking water and health-related facilities available to meet demand (NPC, 2015). Furthermore, payment to the ones maintaining cleanliness of water, controlling the outbreak of diseases caused by water

contamination, and constructing toilets in all houses and public places are equally noted challenges in the Valley. Challenges also exist in operating and maintaining "old and unsystematic assets". Illegal tapping of water connection is equally difficult to control (Jha, 2017).

Investment priority does not match with "real and perceived needs". For example, National Drinking Water Quality Standard is in place since the last decade but supplied piped water does not meet the standard. The community-managed decentralised wastewater treatment system has been found effective, however its replication is poor.

Inadequate finance and technologies are also the challenges to implement or replicate "good practices" and engage institutions and Local Level in expanding water supply and sanitation facilities.

Nepal has moved from unitary to federal system. The Constitution of Nepal (2015) provides legal powers and duties to make the Local Level effective and efficient. In case of water source protection and use such as in situation of water source in one State or municipality and use by another State or municipality), inter- and intra-State conflict might emerge on water and sewerage or waste disposal which may demand central level to settle disputes between provinces andurban and rural municipalities (Bhatta, 2017).

In summary, institutional linkages and coordination are not at desired level; funding is not enough to deliver urgent and immediate supports for water supply and sanitation; implementation of unplanned activities has not delivered desired services; distribution of "under quality" water from both piped and tankers has challenged human health and has increased cost of living in Kathmandu Valley.

Opportunities exist to overcome these challenges. Effective implementation of policies and plans, including other facilitative instruments such as guidelines and their performance-based monitoring would change the situation. Actions as included in SDMP are proposed to be implemented by the Project Implementation Directorate and KUKL with support from municipalities, KVDA and relevant agencies (KDVA, 2016).

The water supply system provides opportunities to create new jobs, develop leadership, increase market value of water, and build capacity (Jha, 2017). In order to ensure systematic management, preparation and issuance of operational and maintenance manual, implementation of water safety plan, adoption of standard operating procedure and institutional strengthening deserve special attention. Need for cooperation amongst responsible institutions engaged in offering drinking water, sewerage, groundwater resources, tanker services and government and non-governmental stakeholders has been realised to manage and provide quality and dependable drinking water and sanitation services. Furthermore, rainwater collection and tanker services would provide opportunities to regulate drinking water supply. Realised opportunity is to mobilise alternative sources (of drinking water), utilisation of groundwater sources, rainwater collection and tanker services, including additional improvement and expansion of existing distribution system to provide quality water to consumers. Additional activities focus on increment of water production, storage and expansion of distribution system, structural strengthening and institutional improvement and regulating the works of the service providers on water supply.

In May 2017, the election of Local Level took place in Kathmandu Valley and provided multiple opportunities to implement policy and programme commitments. The elected Mayors and Deputy Mayors including Ward Chair, and Ward Members have started to work on the matter, and hopefully will expedite coordination efforts. In June and July 2017, executives of the Kathmandu Metropolitan City made a decision in the meeting that the disposal and management of wastes to be completed before sunrise, and immediately start construction of public toilets in possible areas (http://kasthamandap.nagariknews.com/, 28 July 2017),

Cities and urban authorities could take exemplary work in providing adequate and high quality drinking water and minimum basic sanitation facilities. Decentralisation of these services might be more effective in providing and maintaining quality services. Existing periodic policies, master plans, plans and programmes and legal provisions with other facilitative instruments provide multiple opportunities to make water supply and sanitation services effective and efficient in the Valley. Existing practices of conserving traditional water resources, and sanitation good practices requires upgrading and up-scaling.

Chapter Four

THE STRATEGY FOR URBAN WATER AND SANITATION FACILITIES

This Strategy paper provides opportunities to understand "where we are," "where we want to reach" and "how we reach there." The importance of conservation of water sources and sanitation services have been realised due to accelerated negative health impacts from haphazard urbanisation and under quality and inadequate water supply and sanitation facilities in Kathmandu Valley. Existing faecal sludge and solid waste management (collection, transportation, 3R and disposal), wastewater treatment, discharge into the river system, and conversion of traditional ponds, wells and spouts for other purposes have posed additional challenges in the Valley. It deserves special attention to address them timely so as to least affect human health and ecosystem functioning. The cost of delay action and inaction is increasing that would result to tremendous adverse effect on life, including of "policy- and decision-makers and implementers" and life-support system.

The Kathmandu Valley – capital city of Nepal – requires consolidated integrated actions and concerted efforts of multi-stakeholders to address water and sanitation challenges. Avoiding duplication of efforts and coordinated and joint actions of public, private and NGOs/CBOs such as water users and sanitation committees would provide multiple avenues to address the on-going threats of wastewater handling. Policies, programmes and institutions exist but institutions should be capacitated to implement policies, strategies, plans and programmes. Strong willingness to pay provides opportunities to generate necessary financial resources with user's participation. In-country proven technologies for wastewater treatment and resource mobilisation (both domestic and international), and capacity development at operational levels, including recent decisions of elected body of municipalities, generates momentum to offer safe drinking water and improved sanitation services.

International initiatives and national needs and commitments on SDGs 6 and 11, and New Urban Agenda provide additional opportunities to offer water supply and sanitation services in Kathmandu Valley. As one of the active countries in participating in all processes of SDGs preparation, it is both national requirements and international commitments to concentrate for sustainable management of water resources and sanitation facilities, and make every effort to make cities and human settlements safe and resilient to external effects. In view of the nature of SDGs, Goal 17 is very important for Nepal as it calls for "strengthening the means of implementation and revitalise the global partnership for sustainable development"

Recalling the issues, challenges, state of implementation of existing policies, plans and programmes, and urgency of supplying safe drinking water and managing solid wastes, wastewater and faecal sludge, including through treatment plants, the need of a strategy on water supply and sanitation has been greatly realised for Kathmandu Valley. This Strategy will likely contribute to take new initiatives for newly elected Mayors and the team in integrating SDGs 6 and 11 into municipal development plans and implement them effectively to translate their commitments in election manifesto into action. The following Strategy opens multiple avenues to fulfil national commitments on SDGs 6 and 11 and needs of Kathmandu people:

4.1 The Strategy

The Kathmandu Valley is experiencing change in social and economic development and political setup. The Valley will now be ruled from federal, provincial and local level governments under the Constitution (2015). Previous Village Development Committees of the Valley have been merged to form municipalities. Based on understanding of how change has happened, and will likely to happen, this Strategy Paper addresses the needs and commitments required for achieving safe water, sanitation and hygiene for all people of Kathmandu Valley while meeting the SDGs 6 and 11 and key priorities of the New Agenda for Sustainable Urban Development. The Strategy Paper outlines the vision, mission and objectives along with priority actions and implementation arrangement.

The vision of this Strategy is to provide everyone safe water and sanitation in Kathmandu Valley by 2030 while the Mission is to improve access to safe water, sanitation, hygiene and affordable housing.

4.1.1 Goals and objectives

The goals of the Strategy are to: (i) provide equal access to safe water and improved sanitation facilities to citizens; (ii) provide affordable and resilient housing with wastewater and faecal sludge management facilities; (iii) conserve traditional and groundwater sources; and (iv) strengthen resource mobilisation with non-polluting technologies and enhanced institutional and individual capacity.

The objective of the Strategy is achieve the goals mentioned above by availing adequate and safe drinking water and improve water use efficiency, adopting 3R practices by managing wastewater and faecal sludge, and conserving traditional and groundwater resources. The detailed objectives of the Strategy Paper are as follows:

a. Effectively implement existing policies, plans, standards, guidelines and frameworks on management of water and sanitation for all, and provide safe and affordable housing;
b. Integrate environmentally safe water supply and sanitation facilities in new policies, programmes and activities to reduce health implications from water-borne and sanitation and hygiene-related diseases;
c. Ensure compliance with national standards on water quality and basic sanitation and housing norms;
d. Explore and access domestic and international financial resources and build institutional and individual capacity to manage solid wastes, wastewater and faecal sludge, and conserve water sources; and
e. Align development of water supply and sanitation facilities with SDGs 6 and 11 and New Urban Agenda.

4.1.2 Guiding Principles for the Strategy

Municipalities of Kathmandu Valley function as the "service providers" for water supply and sanitation. Municipalities must focus on conservation of traditional water sources and watershed, and promotion of rainwater harvesting and DEWATs. In case of sludge management, municipalities could provide guidance and technical supports, ensure coordination, collection and transportation and final disposal, and perform regulatory functions, capacity development and monitoring. This Strategy considers the following guiding principles in order to ensure alignment

of SDGs targets and indicators and NUA while improving water supply and sanitation facilities in Kathmandu Valley:

a. Encourage municipalities (metropolitan, sub-metropolitan and municipalities) to prepare and implement local sustainable development agenda, including emergency water plan for public use (after an earthquake or disaster) to address city concerns and challenges on water supply and sanitation;
b. Explore opportunities to integrate safe water supply and sanitation facilities in new policies, programmes and activities for urban areas;
c. Encourage municipalities to integrate provisions for safe water, wastewater and faecal sludge management and conservation of surface and groundwater in permit (license) of multi-storey commercial, industrial and residential buildings;
d. Promote multi-stakeholder participation, including water users and sanitation committees in providing inputs in selection, design, implementation and monitoring, and help government to take overall leadership and report to KVWSMB on functioning of water supply and sanitation facilities on a sustained manner;
e. Explore, access and mobilise domestic and international resources for "hardware" interventions (infrastructure and efficient technologies) on water supply and sanitation facilities (wastewater treatment and sludge management); and
f. Develop standard operational procedures for safe water and wastewater and faecal sludge management and orient/train local level technical staff in using and complying with such procedures.

4.1.3 Key strategies

The state and impact of existing water supply and sanitation facilities, including wastewater and sludge management and conservation of traditional water sources in Kathmandu Valley warrants practical, people-centric and effective strategies and actions that municipalities could implement with resources and necessary supports from State and Central governments. The following strategies will contribute to meet the desired goals and objectives, outlined above:

A. Implementing existing instruments

The Government has formulated sectoral and periodic policies and strategies on water supply, sanitation, hygiene, and urban development, including wastewater management, conservation of surface and groundwater resources. In 2016 and 2017, the Government had issued sector development master plan, urban strategy, and framework on faecal sludge management. The following strategies call for implementing most relevant and important existing policies, plans, programmes, guidelines and framework to address water supply and sanitation challenges in Kathmandu Valley by:

a. Including "budgeted" activities into annual programme of municipalities and implementing with active participation of water users and sanitation committees, and relevant multi-stakeholders, where appropriate;
b. Facilitating implementation and performance monitoring of target specific programmes and projects;
c. Promoting operation of all wastewater treatment plants and establishing new ones, where necessary;
d. Promoting, scaling up, and/or replicating bio-methanisation (production of methane gas from solid wastes);

e. Preparing "stand-by budgeted" emergency water plan (with disaster-proof potable water storage facility for at least 5 days) for public use for immediate response to disasters (earthquake); and
f. Regulating groundwater extraction and conserving surface water sources.

B. Integrating SDGs into local plans and programmes

Improved water, sanitation and housing facilities are prerequisites for achieving SDGs 6 and 11. Integrated approach will be required for implementation of actions taken for SDG targets. It is, therefore, necessary to ensure integration of SDGs into relevant existing and new policies, plans, programmes and activities by:

a. Integrating policy relevant activities on safe water and sanitation facilities into plans and programmes, including annual programme of municipalities of Kathmandu Valley;
b. Integrating sanitation safety plan[4] into municipality plan and programme;
c. Integrating rainwater harvesting, water purification, decentralized wastewater treatment, faecal sludge management and groundwater recharge and sustainable use options into plans and programmes of municipalities of Kathmandu Valley and implement them; and
d. Integrating rainwater harvesting, DEWATS, and groundwater recharge provisions into construction approval of multi-storey multi-purpose buildings (3 in one such as recreation, apartment and commercial mall), housing complex and corporate building.

C. Localising SDGs

The Agenda 21 adopted during the Rio Earth Summit in 1992 was implemented in many countries including Nepal, however to a limited extent. Some countries prepared local Agenda 21 and efforts are made for implementation with limited resources. In contrast, the implementation of MDGs was more successful compared to other international initiatives. Currently, countries are reviewing global SDG targets and indicators and planning to integrate them into national development process. The localization of SDGs is essential for better implementation and coordinated efforts. In the view of the current structure, Constitutional rights of the Local Level institutions and newly elected bodies in municipalities, it is advised to prepare local sustainable urban development agenda (LSUDA) with full integration of relevant SDGs, in particular SDGs 6 and 11 and NUA. The following strategies will help in localising SDGs, NUA and other processes by:

a. Preparing and implementing local sustainable urban development agenda (Kathmandu Agenda) on water supply and sanitation in line with SDGs 6, 11 and 17 and New Urban Agenda in order to, *inter alia*, promote "waste to energy", manage faecal sludge, rainwater (drainage) and solid waste, treat wastewater, and conserve and recharge water bodies (ponds, lakes, spouts etc) and groundwater;
b. Allocating x% of grant money from central government for implementation of Kathmandu Agenda;
c. Encouraging Metropolitan and Sub-metropolitan cities and Municipalities to allocate x% of domestic resources and exploring additional funding for implementation of Kathmandu Agenda; and
d. Preparing and publishing annual report on state of implementation of Kathmandu Agenda.

[4] Sanitation safety plan describes sanitation system by identifying hazardous events, assessing existing control measures and exposure risks, developing and implementing an incremental improvement plan, monitoring control measures and verifying performance, and developing supporting programmes and reviewing plans.

In addition to above strategies, LSUDA (Kathmandu Agenda) should also consider the following as "entry point" to benefit from global initiates on sustainable urban development:

a. Expanding coverage of women and children-sensitive public toilets with adequate water in all municipalities of Kathmandu Valley;
b. Using rainwater harvesting and groundwater recharge for adequate supply of safe water;
c. Promoting environmentally safe 3R technologies and operating fully the existing wastewater treatment plants to discharge only treated wastewater into river system;
d. Promoting access to environmentally safe and affordable housing and basic services and enhancing sustainable human settlement planning in Kathmandu Valley;
e. Assisting local communities in building adaptive capacity and resilience to disasters, including water-related and climate change-induced disasters, and in managing municipal and other wastes;
f. Strengthening domestic resources and mobilising additional financial resources for safe water and sanitation facilities and human settlements;
g. Enhancing support for effective and targeted capacity-building to prepare and implement SDGs and NUA focussed or embedded city action agenda; and
h. Encouraging and promoting effective public, public-private and civil society partnerships, building on experience and resource sharing strategy of partnerships.

With necessary support from competent government ministries and relevant multi-stakeholders, municipalities may take leadership in implementing development activities aligned with SDGs in Kathmandu Valley to benefit from global initiatives, in particular from water supply and sanitation services in an environmentally efficient way.

D. Creating incentives

National and international initiatives on SDGs and urban agenda encourage full and effective participation of multi-stakeholders in designing, implementation, monitoring, and evaluation of actions. Nepali policies and legislative provisions are placed to ensure proactive participation of water users and sanitation committees in expanding services. Building on existing approaches with multi-stakeholder participation, appropriate incentive mechanisms are to be designed to provide safe water and improved sanitation services to the people of Kathmandu Valley. Hence, LSUDA should consider;

a. Developing and implementing economic instruments and "recognition provision" to promote effective participation of private sector and civil society organizations in water supply and sanitation services;
b. Incentivising municipalities or wards in conserving water sources, operating DEWATS, and implementing wastewater treatment plants and faecal sludge management facilities;
c. Incentivising provision of water and sanitation facilities to urban poor and marginalized communities;
d. Recognising and awarding private sector, NGOs and CSOs and individuals promoting safe water supply and improved sanitation facilities, establishing and operating DEWATS, faecal sludge management and water conservation activities, and reutilising domestic wastewater; and
e. Providing concessional financial resources to and enhancing capacity of multi-stakeholders engaged in water supply, sanitation and hygiene facilities.

E. Pricing water and sanitation services

The Constitution of Nepal (2015) describes water supply and sanitation as fundamental rights of the people, including exclusive right on access to health services and fundamental right to get information about medical treatment (Annex 4.1). It seems sensible in principle, however, delivering such services is not an easy task from operational point of view. Although every citizen of Kathmandu Valley is thought to have this fundamental right, there are several problems that impedes the operation. For example, Nepal has, in general, low affordable capacity for modern technologies for wastewater treatments; Government has resource (funding, technology and human resources) constraints; and findings of a study on willingness of Kathmandu Valley people to pay "reasonable" extra money for quality water and sanitation services. In this context, Nepal should consider:

a. Adopting a policy to promote "zero waste" of water and enacting or amending legislation to ensure "water and sanitation services" as "commodity";
b. Introducing scientific approach of tariff setting for sanitation facilities;
c. Stabilizing water price and/or 'progressive pricing' with improved provisions of piped water (for any use) and sanitation and hygiene services;
d. Investing on water source protection to create "water market" for trade of safe potable water;
e. Promoting eco-efficient infrastructure construction and providing subsidies for safe water and sanitation facilities, in particular rainwater harvesting, wastewater treatment plants, faecal sludge management, and conservation of traditional water sources and groundwater; and
f. Ensuring operation and maintenance for regular supply of safe water and sanitation services.

F. Promoting data generation and monitoring

Relevant, appropriate and site-specific data and information are required to properly design and plan activities. The findings of compliance and impact monitoring provide basis for planning and designing water supply and sanitation facilities. While upstream water source does not face much problems, wastewater sewer lines are difficult to construct and operate in undulating landscape of the Valley. In this context, data generation and monitoring should be promoted for refining existing plans and programmes and for future planning and implementation of water supply and sanitation facilities in Kathmandu Valley by:

a. Mapping traditional water sources (important wells, spouts, and ponds also having cultural and religious values), groundwater sources, groundwater recharge zones, wastewater collection and treatment plants, solid waste management sites and/or faecal sludge storage or discharge sites;
b. Developing GIS supported data base and status map on water availability, supply and use, functioning of sewers with clear locations on joints and manholes; and
c. Assessing periodic change in water demand, wastewater quantity (including faecal sludge) and hydrology data.

G. Strengthening infrastructures

Eco-friendly infrastructure contributes to improved sanitation facilities and reduction of outbreaks of food, water and vector-borne diseases (Karki, 2017). The following infrastructures need priority in offering water supply and improved sanitation facilities in the Valley:

a. Installing shallow and deep tube wells and building water harvesting tanks and reservoirs (water storage facilities);

b. Installing technologies to clean wastewater (combine/hybrid) and women/gender-friendly eco-san (ecological sanitation) public toilets; and
c. Promoting technologies for energy generation (biogas) from wastes, DEWATS, and rainwater harvesting (roof top water harvesting) at public and commercial multi-story buildings and at individual household.

H. Means of implementation

Relevant policies, legislations, standards, guidelines and framework on safe water supply, sanitation services, requirements for wastewater treatment and faecal sludge management and conservation and rational use of water sources are in place in Nepal. Several institutions (public, private and civil society organisations) have been established and strengthened but the quality of water and sanitation services is yet to improve. It is related to the means of implementation such as inadequate finance, technologies, human resources and their technical and managerial capacities, institutional mandate, and good practices. These are vital in order to ensure effective implementation of SDGs 6, 11 and 17 and new urban agenda. Adoption of following strategies would contribute to implement above broad strategies in Kathmandu Valley:

a. Expanding mandate for collaborative and cost-sharing efforts for water supply and sanitation infrastructures and their operations;
b. Increasing investment in drinking water, sewers and drainage infrastructures;
c. Developing a system for tracking and monitoring implementation of agreed activities with regular reporting to competent government organization (KVDA and KVWSMB);
d. Increasing capacity of responsible agency for water supply and sanitation in Kathmandu Valley to provide technical support to municipalities in constructing and operating water supply system, wastewater treatment plants, rainwater harvesting systems, and faecal sludge management interventions;
e. Promoting use of affordable renewable energy operated eco-efficient technologies such as RWH, DEWATs and groundwater use and recharging;
f. Promoting partnership arrangement (public, private/business, NGOs/CBOs and academia) for delivery of safe and quality water and sanitation services, water use efficiency with cost- and benefit sharing approaches; and
g. Collecting and sharing good practices on knowledge, technologies and operational procedures with transparent and accessible knowledge management system.

In order for wider sharing of good practices, municipalities are encouraged to engage both electronic and print media.

4.2 Priority actions for strategy implementation

A number of activities are required to effectively implement above strategies to promote implementation of existing instruments, integration of SDGs in local to national planning processes, localising SDGs, incentivising multi-stakeholders and pricing water and sanitation services. The following generic actions are considered as “entry points” to ensure water supply and sanitation services in Kathmandu Valley along with facilities for wastewater treatment, faecal sludge management, and conservation of surface and groundwater sources.

a. Identify existing theme-based (water supply and sanitation) and location-specific actions as included in relevant policies and programmes and include in annual programmes of municipalities of Kathmandu Valley along with budget and human resources;

b. Integrate and implement rainwater harvesting, water purification, 3R approach of waste management, decentralized wastewater treatment, faecal sludge management and groundwater recharge options and technologies into municipality plans and programmes;
c. Ensure that construction permit of multi-story public and commercial buildings and apartments has provisions for rainwater harvesting, groundwater recharge and DEWATS;
d. Prepare and implement LSUDA for Kathmandu Valley with full participation of all municipalities, Valley focussed institutions such as KVDA, KVWSMB, KUKL and HPCIDBC and relevant multi-stakeholders;
e. Explore opportunities to treat water and sanitation services as commodity to develop a mechanism for pricing of piped water, sanitation and hygiene services;
f. Generate and share knowledge and lessons learned, and build/enhance capacity of the service providers (mostly municipalities) in providing safe water and improved sanitation facilities;
g. Include water and sanitation services in municipality's performance review criteria for annual grant scheme; and
h. Support municipalities to access funding from different sources (dedicated domestic, bilateral and multilateral sources) to prepare and implement LSUDA.

In addition to above "core" activities, "supportive" activities on water and sanitation services are to:

1. Conserve surface and underground water sources, mainly watersheds and develop green parks through joint/collaborative efforts for inter State and inter-municipality inter-basins;
2. Promote public-private-civil society-academic partnership for securing additional financing and technical support on water and sanitation infrastructures such as construction and operation of existing and new drinking water, sewers and drainage, wastewater treatment, including water source protection (wells, ponds, spouts) and groundwater recharge;
3. Locate and compile, conserve and revive traditional sources of water(sprouts, wells and ponds) in Kathmandu Valley;
4. Promote municipalities to construct gender and disables-friendly public toilets at appropriate places (with sufficient water and renewable energy provisions or waste to energy) and ensure their operation and maintenance, and generate biogas from public and community toilets as appropriate;
5. Ensure implementation of decentralised eco-efficient urban water infrastructures such as constructed wetlands for wastewater, ecosan toilets and reuse treated water for recharging rivers;
6. Implement waste segregation into biodegradable and non-biodegradable at source and impose tax for non-compliance, and adopt 3R approach at household level including composting.

4.3 Barriers and opportunities

The Constitution of Nepal (2015) states executive, legislative and judicial rights and duties to Local Level. The Kathmandu Valley has 2 Metropolitan Cities and 16 municipalities. The water supply and sanitation services require extensive amount of investment in infrastructures such as for drinking water, surface drainage and sewer lines, wastewater treatment plants, and public toilets. Investments at operational level might also be costly due to unregulated waste disposal

practices (including plastics), sewer lines in undulating landscape and change in precipitation trend over the years.

Barriers are more or less related to policy and programmes, capacity enhancement and budget allocation. The national policies and programmes are not considered barriers to provide water supply and improved sanitation services in Kathmandu Valley. However, some risks exist for effective implementation and maintenance. Most important risk is related to financial allocation for infrastructures, technologies, and capacity development along with operational and maintenance cost. As Valley has 18 Local Level governments, resource generation and sharing for water supply and wastewater treatment would require functional coordination and cooperation between and within municipalities and districts. The following generic risks have been identified and mitigation options are proposed to overcome the risks:

Table 4.1: **Risks and Mitigation Options**

SN	Risks	Level of Risks	Mitigation Options
A. Implementation of existing instruments (Policy, plan and programme)			
1	Kathmandu Valley will be ruled by 18 Local Levels, a Province and a Central Level government of different political Parties having divergent commitments, and hence, priority activities on supply and sanitation might differ.	Low	KVDA, KVWSMB and KUKL should assist and facilitate municipalities in prioritising and implementing key activities on water and sanitation.
2	Priority of each municipality might differ based on water availability and challenges faced. It might lead to non-implementation of water supply and sanitation related plans and programmes.	Low	Awareness raising at political level (Mayor and Deputy Mayer) and skill development at functional level (technicians) would contribute to design and implement as per policy priorities and needs of municipality.
3	Constitutional Rights of Local, Province and Central Levels require functional coordination to minimise conflict on sources and users of water or groundwater and waste disposal sites.	Medium	Regular interaction between and within municipalities would provide options to address divergent views and collectively address conflict, if any and manage wastewater and faecal sludge.
4	Three districts of Kathmandu Valley share rivers and population density and facilities differ. Pollution from upstream municipality(ies) might affect people and resources at the downstream.	Medium	Functional coordination, and regular interaction and dialogue between and within municipalities would relax and address this problem. Cost-sharing approach might reduce it.
5	Non-response in integrating water supply and sanitation concerns in local planning processes and annual programmes would accelerate problem.	Low	KVDA and KVWSMB should coordinate municipalities and encourage integration of water and sanitation issues in local plans with implementation & budget provisions.
6	Municipalities may not be interested in pricing water and sanitation services as "commodity" and generate domestic resources	High	Water and sanitation is provided by Government as essential component of social development and additional pricing concept will encourage elected bodies to generate resources.

7	Difficulties in establishing and operationalising cost- and benefit-sharing approaches will continue in municipalities as they areled by different political Parties	Medium	Generating domestic resources for water and sanitation activities is challenging and hence an independent organisation like KVDA and KVWSMB should lead the process for developing mechanism for cost- and benefit sharing and encourage municipalities for implementation.
B. Financing and Budgeting			
8	High investment required but less priority in financing water supply and sanitation infrastructures will continue.	Medium	Funding gap in municipalities could be bridged by generating domestic resources, and by accessing and securing bilateral and multilateral sources.
9	Partnership in financing for construction of water and sanitation infrastructures and their operation might not work in practice as municipalities with elected members from different political parties.	Medium	Fund access from Central, State and Local Levels and channel to municipalities would enhance partnership for infrastructures development. This approach has worked and should work.
10	Delay in budgetary process and gap between budget allocation and disbursement will continue.	Medium	Municipality Council/Assembly should regularly meet, and facilitate for programme development, approval and timely fund disbursement and encourage municipalities for actual budget costing.
11	Budget ceilings limit expansion of water and sanitation infrastructures.	High	Domestic resource generation and prioritisation to water supply and sanitation and access to bilateral and multilateral dedicated funding sources would help in reducing the risk.
C. Service delivery			
12	Inadequate understanding and/or priority of service providers (municipalities) and receivers would affect service delivery	Low	Benefits of safe water, no waste of water, wastewater treatment facilities and faecal sludge management should be repeatedly informed to beneficiaries through NGOs, water users, sanitation committees and media could perform it.
13	"Living with" scarce water and poor sanitation facilities will undermine benefits of safe drinking water and improved sanitation facilities	Medium	"Willingness to pay", accepting water and sanitation as "commodity" and pricing on wastewater and sludge disposal would reduce haphazard discharge of wastewater, generate domestic resources, and improve sanitation.

Although some risks are rated "medium and high", political commitment along with technical and financial supports would substantially reduce risks and bring to acceptable level. For example, decisions of Kathmandu Metropolitan City immediately after the election in June-August 2017, on waste disposal and toilets construction at public places provide opportunities to reduce risks. Implementation of proposed activities through "better partnership" arrangement and multi-stakeholder participation would help in reducing predicted risks. As Kathmandu Valley is the capital city, Central Government would facilitate in prioritising and implementing water supply

and sanitation-related activities. The Government should provide technical back-up facilities, and function as a monitor, enabler and enhancer while municipalities would implement programmes.

Effective implementation of existing policies, plans and programmes provides multiple opportunities to provide safe water and environment-friendly improved sanitation facilities in Kathmandu Valley. The newly elected body (Mayors, Deputy Mayors, Ward Chairs and Ward Members) have political commitments to provide adequate services and translate their election manifesto into action. Necessary guidelines and manuals are formulated for rainwater harvesting; groundwater, sludge management, decentralised wastewater treatment facilities have been piloted and proved efficient; need for groundwater recharge has been realised; and safe water and improved sanitation has received adequate attention. Election manifesto of political Parties has commitments to provide toilet in each house, launching of a 5-year programme on "one poor family: one free tap water", supply of safe drinking water in each settlement, conservation of drinking water sources and water quality improvement; and make water scarcity free capital; development of at least 20 lakes and make Bagmati, Vishnumati, Manohara and Hanumante rivers pollution-free, and treatment of all wastewaters (of sewers) before discharging to rivers and ponds. This political commitment would help to provide safe water and environmentally sound sanitation facilities. Furthermore, strong commitment of the Government staff, including of KVDA and KVWSMB will contribute to implement the strategy effectively to reposition ecological and cultural image of Kathmandu Valley.

Multiple windows of opportunities exist to scale-up safe water supply and sanitation facilities. Existing policies, plans, programmes and guidelines or framework provide the Government and municipalities opportunities to construct water infrastructures to address challenges related to drinking water, wastewater treatment, sanitation and hygiene, faecal sludge management and conservation of water sources, including groundwater recharge.

The Strategy provides opportunities in: (i) integrating experiences, knowledge and lessons learned from implementation of previous policies, plansand action plans; (ii) addressing new challenges and needs such as sustainability, upgrading, enhancing access to services, social and environmental safeguards etc; (iii) rethinking communication approach on water and sanitation development in "educated urban areas"; (iv) informing the "complex urban future"; (v) aligning with international initiatives and national needs such as SDGs 6 and 11, New Urban Agenda and/or 2015 Sendai framework on disaster risk reduction; (vi) revisiting national gaps and needs on safe drinking water, adequate sanitation and hygiene, addressing untreated wastewater and enhancing water-use efficiency; accessing safe and affordable housing and basic services in cities, and knowing *ex ante* impact of climate-induced disasters in urban areas etc.

The LSUDA provides opportunities to prepare governments at all levels (Central, State and Local) to achieve SDG targets (particularly goals 6 and 11), and address NUA focus areas. Nepal needs to identify and reevaluate resources and "readiness" parameters such as readiness on natural resources, regulatory framework, institutional framework, financial framework, infrastructure, technological and people (people's readiness) (Wedahuditama, 2017). For example, financial framework should focus on available funding, fund channeling mechanism, and expenditure policy. The LSUDA provides municipalities opportunity to further realise key elements of SDGs and NUA and reflect political mandate and commitments of newly elected bodies in Kathmandu

Valley. This is expected to encourage about 200 additional municipalities of Nepal to prepare and implement LSUDA to address SDGs and NUA for the next 12-13 years and beyond.

Chapter Five

STRATEGY IMPLEMENTAITON ARRANGEMENT

Implementation of policies, plans and programmes requires concrete approach to make them effective and far reaching. Its implementation would be straightforward by setting an implementation modality, resource allocation, data and knowledge generation and sharing, and mobilisation of knowledge-based/skilled human resources. Multi-stakeholder participation would contribute to build partnership amongst public and private sectors and civil society organisations. This Strategy outlines number of activities that require modest resources (human, finance and technology) for implementation and benefit local people. Several elements are important to implement the Strategy effectively and efficiently. This focuses on institutional strengthening, partnership arrangement, and means of implementation.

5.1 Building Stronger Institutions

Three levels of institutions will be engaged in coordination for water supply and sanitation activities in Kathmandu Valley. They are policy-making, technical departments and Board, and municipalities. Effective participation of beneficiaries is equally important in order to avoid multi-party interests and inter- and intra-municipality conflicts on water source use and waste disposal.

Based on the Business Allocation Rules of the Government (2015), MoWSS will formulate policies for water supply and sanitation. The MoUD will provide policy guidance and coordinateurban development activities of municipalities. The DoWSS and DoUDBC will provide technical supports related to the development and implementation of codes and norms, guidelines and manuals on water supply, sanitation and building codes, including rainwater harvesting and DEWATS. The KVWSMB and KUKL will ensure functional coordination and encourage for effective participation of relevant stakeholders. As mentioned in section # 3.3.7 of this paper and in Rainwater Harvesting Guidelines, revitalising coordination mechanism, including Municipality Level Committee, deserves special attention in promoting water supply and sanitation in Kathmandu Valley (Annexes 3.4, and 5.1).The National Water Supply, Sanitation and Hygiene Coordination Committee will ensure inter-ministry coordination, including for faecal sludge management. Furthermore, City Drinking Water and Sanitation Coordination Committee and Water Users and Sanitation Committees will be engaged in promoting water supply and sanitation services in the Valley. Similarly, KUKL and Project Implementation Directorate (PID) will have functional role in supplying drinking water in the Valley. Municipalities of Kathmandu Valley will have implementation and coordination responsibilities with much focus on implementation.

In addition to institutions mentioned in 3.3.1, Ministry of Population and Environment and its Department of Environment will have key roles and responsibilities in supporting for pollution control and environmental improvement. The National Planning Commission would have greater role in integrating, prioritising and allocating budget for water supply and sanitation and hygiene related programmes. Similarly, Parliamentary Committee on Environment Protection also provides guidance and instruction to improve environmental quality. This demands to strengthen and equip newly established municipalities to respond these needs effectively and efficiently.

Review of mandates clearly indicates engagement of several institutions in formulating policies, and providing guidance and coordination. Municipalities will be directly engaged in the implementation of key activities as outlined in this Strategy. Hence, capacity strengthening at municipality and individual levels is an essential component of the proposed Strategy. Exposure, orientation and training would help to update, institutionalise and benefit from safe water supply, wastewater treatment, faecal sludge management, conversion of waste to energy, rainwater harvesting and recharge and conservation of water sources to promote sustainable urban development, and achieve sustainable development goals, in particular goals 6 and 11 and key focus of NUA. Hence, municipalities should be sufficiently strengthened to implement LSUDA and other activities as mentioned in this Strategy.

5.2 Partnership arrangement

Based on election manifesto and functions of municipalities, elected bodies will assume overall responsibilities for planning, designing and implementing water supply and sanitation activities. Location and state of Kathmandu Valley demand for close cooperation and coordination between and within municipalities to provide better services due to interdependences and potential impacts of one's activity on another's jurisdiction. The water source conservation and utilisation, waste disposal, construction of public toilets, wastewater discharge or treatments or groundwater abstraction and recharge all require higher level of functional coordination. Water resources of one municipality and water supply in another one should not be disrupted and might require inter-basin, inter-province and inter-Local Level coordination and cooperation. Any disruption would affect existing water supply from private tankers.

The Central Level Government generally has a facilitative role. It implements non-legally binding instruments such as policies, plans, programmes, guidelines, frameworks or manuals, etcand legally binding instruments such as legislations, rules, standards or norms. As several institutions and programmes are already in place,, responsibilities of implementation lie with local elected bodies, the municipalities in Kathmandu Valley. Partnership arrangement between and within multi-stakeholders will provide better and quality services. NGOs and CBOs are sufficiently promoted in raising awareness and implementing "software" activities. For example, intensive participation of water users and sanitation committees has been productive during the development and operational phases of water supply and sanitation facilities.

Nepal has established public-private partnership model and been promoting collaborative efforts. In social service sector such as water and sanitation, users and communities are more engaged in developing and managing services. Hence, municipalities should be encouraged to adopt and/or promote multi-stakeholder partnership approach where municipalities may wish to implement public-private partnership, public-private-civil society partnership, public-civil society partnership, public-academe-civil society partnership or public-private-academe-civil society partnership to feel multi-stakeholders inclusive approach, engage community-based organisations and local clubs, and also promote ownership for sustained use of water supply and sanitation services. Functional coordination between partners and stakeholders is a pre-requisite for effective implementation and sustained use. This arrangement will provide opportunity to share information, knowledge, ideas and concerns, experiences and lessons, and promote sharing of costs and benefits. The partnership arrangement should promote for self-governance to transpire Kathmandu Valley a "smart city" functionally.

KVDA and KVWSMB are functional bodies to establish and promote triangular partnership of public, private, and civil society organisations in Kathmandu Valley to provide safe water supply and environment-friendly sanitation facilities such as eco-san, wastewater treatment and safe disposal, and solid waste and faecal sludge management, including conservation of traditional sources of water such as ponds, spouts and wells. Such partnership has worked and should work under the "leadership" of the government.

5.3 Means of implementation

In order to ensure effective implementation of the Strategy, it is essential to have adequate funding, environment-friendly and appropriate technologies, capacity of partners and municipalities, functionality of coordination mechanism and engagement of multi-stakeholders with necessary data, information and learning. Prior understanding on Means of Implementation (MoI) is necessary to take action in generating and utilising resources, technologies, and developing and/or enhancing capacities. As implementation of SDGs and New Urban Agenda lies with Local Level, MoI should be localised in such a way that municipalities in the Valley could generate necessary resources and effectively implement the Strategy to provide safe drinking water and sanitation services in order to improve health of human being and natural resources.

5.3.1 Fund generation and mobilisation

Water supply and sanitation infrastructures require large amount of investment in the built-up urban areas. Existing haphazard and unregulated urbanisation in Kathmandu Valley further complicates infrastructures development even in case of availability of necessary investment, technologies and human resources. It is because add-on solution is costly and sometimes disruptive. For existing facilities, it requires additional investment (financial resources) to provide safe water and sanitation services at sustained basis as an add-on option, and it needs to promote build-on approach (integration into planning process) in future activities, particularly in planned satellite towns.

Although realised at policy- and decision-making levels and service providers (municipalities) and beneficiaries (people of Kathmandu Valley, including seasonal migrants), scarcity of drinking water, increased load of pollutants, low sanitation and hygiene facilities and sanitation-induced health damages call for urgent action. Fund generation and its mobilisation are two important elements for effective implementation of the Strategy. Required funding could be generated from multiple sources such as domestic, bilateral and multilateral, commitment of developed and developing countries to Least Developed Countries (LDCs), or international cooperation and partnership such as Addis Ababa Action Agenda on Financing for Development and/or agenda-based financing commitments. Further realisation from supply of poor quality drinking water and sanitation services would encourage municipalities to generate domestic resources through health or sanitation service fee, time-bound levy on industrial effluents and/or electronic and medical wastes, or increase grant" from central government on water and sanitation to reduce accelerated health cost from water pollution and poor sanitation.

The Constitution of Nepal (2015) empowers local government to enact and enforce legislation. Municipalities in Kathmandu Valley may wish to generate resources from climate finance by introducing "green tax" and enforce environmental laws, and encouraging private and non-governmental sector in developing facilities through initial investment.

In order to ensure supply of quality water and construct sanitation infrastructures, including rainwater harvesting and groundwater recharge, water conservation, water quality improvement activities, and DEWATS at sustained basis, municipalities of Kathmandu Valley may generate and mobilise financial resources by:

a. introducing green tax and health or sanitation service fee, or levy on electronic and medical wastes;
b. implementing the "use and pay" approach through meter system for quality drinking water and household sewers providing economic incentives and rewards for low amount of water users or no waste of water;
c. providing economic incentives for community DEWATs, RWH and groundwater recharging facilities;
d. improving urban financing by managing municipal (own source) revenue and expenditure;
e. encouraging KVWSMB for frequent review water collection and supply fee and fee from water suppliers and/or license fee and implement appropriate fee structure;
f. accessing existing national fund such as Town Development Fund (TDF) for water and sanitation infrastructures;
g. developing and implementing participatory and cost-sharing arrangement in the spirit of Rural Drinking Water Supply and Sanitation Policy (2003) (80 % Government and 20 % user community's contribution);
h. reviewing existing fees on drinking water, wastes and wastewater fees and making double for public, corporate/commercial and multi-story private buildings;
i. developing national capacity and/or build a cadre of knowledge-based people to access international dedicated financial resources through fast-track mechanism;
j. avoiding fiduciary risks and ensuring rational utilization of financial resources and public auditing of expenditure; and
k. adopting cost recovery approach to sustain social capital and urban fund, if any.

Private sector will not be engaged in drinking water supply and in WASH until water is taken as commodity. Major challenge is how to increase revenue base of the municipalities. Simple and effective system of tax collection would increase number of tax payers. At present, municipalities have not been able to provide minimum basic water and sanitation services. Self-motivation for cost coverage is relatively weak among citizens.

Unless a very practical initiative is in place to generate and mobilise local resources, it is most likely that municipalities of Kathmandu Valley would continue to face economic challenges to meet the increasing demand for the construction of additional water and sanitation infrastructures and upgrading/improving existing infrastructures and their maintenance. Weak institutional base with "cadre and relative-based" human resource mobilisation has largely hindered appropriate design and implementation of projects aimed at providing infrastructure and services to urban people. For climate change-induced water supply and sanitation facilities, Nepal could also access LDC Fund, Adaptation Fund, Special Climate Change Fund, and Green Climate Fund, including other climate funds to build adaptive capacity and make infrastructures climate-resilient.

High cost of living in Kathmandu Valley has also discouraged tax payer for municipal services. Municipalities are unable to allocate and spend investments in water and sanitation infrastructures due to low revenue base and access to bilateral and multilateral sources. Enhanced tax and non-tax revenue collection might be possible by using simple and easy procedures, encouraging urban

residents to pay taxes through a simple process, and mobilising potential revenue sources to improve municipality's economic base. In a nutshell, willingness and commitment of municipalities will find ways to generate and mobilise financial resources and elected bodies should cooperate and implement water and sanitation activities from above their political affiliation.

5.3.2 Technology use

Appropriate and affordable technologies are available to promote water supply and sanitation facilities. Several processes and practices also exist to make these facilities sustainable and rewarding. Academic, research and private sectors are mostly engaged in developing practices and technologies. However, technology development is relatively costly and time-consuming as it requires committed financial and human resources.

Review clearly indicates low priority in allocating and channelling funding and human resources on technology development in general, and water and sanitation-related technologies in particular. In this context, Nepal could refine traditional approaches of water conservation and utilisation and apply modern technologies, including information technologies in developing water and sanitation infrastructures. The Nepal Academy of Science and Technology (NAST) should be encouraged in conducting research on water and sanitation technologies. However, existing challenges on water and sanitation should be addressed using available, appropriate and cost-effective but efficient technologies.

The 2030 Agenda on Sustainable Development encourages countries to access technologies and enhance knowledge through global technology facilitation mechanism, and urges to fully operationalise technology bank and science, technology and innovation capacity-building mechanism for LDCs by 2017. In this perspective and Nepal being the LDC, municipalities should identify environment-friendly and appropriate (service-based) technologies and GoN should:

a. assist municipalities in exploring cost-effective and efficient technologies for safe water supply, sustained groundwater use and recharge, drinking water treatment, and sanitation infrastructures such as wastewater treatment facilities or DEWATs, sludge discharge etc even by accessing from Technology Bank or friendly countries;
b. conduct inventory of appropriate, climate-sensitive, cost-effective and efficient technologies (consider nature of waste) for wastewater treatment and groundwater recharge;
c. allocate funding for accessing environment-friendly technologies and conducting research and development of appropriate technologies; and
d. reassess technologies and replicate their use based on performance, effectiveness and cost-efficiency.

5.3.3 Capacity development

Updated knowledge, information and skill are essential ingredients to translate policy and programmatic commitments into action. Implementation of problem-solving policies and specific actions requires knowledge-based and skilled human resources to deliver timely outputs. Municipalities would require multi-skilled technologists, planners, managers and sociologists to implement strategic actions on water and sanitation. Similarly, capacity is necessary at systemic, institutional and individual levels on groundwater abstraction and recharge at sustained basis, rainwater harvesting, DEWATS and wastewater treatment or sludge management.

The SDG 17 on means of implementation calls for "enhanced support for implementing effective and targeted capacity-building in developing countries to support national plans to implement all SDGs, including through North-South, South-South and triangular cooperation". This goal provides additional opportunities to build capacity in implementing SDGs 6 and 11 in Nepal. In 2015, Nepal had not developed indicators to strengthen capacity building activities to implement SDGs. In view of effective implementation of this Strategy, the following actions would contribute to build target-specific indicators, and enhance national and local capacity to implement water supply and sanitation services in Kathmandu Valley:

a. Develop a roster of organizations and individuals having professional and evidence-based knowledge and capacity to support for safe water supply and improved sanitation services;
b. Assess capacity gaps and needs of municipalities and relevant partners/multi-stakeholders for water and sanitation services in water recharge, waste disposal and wastewater treatment facilities;
c. Organize capacity building training-workshop or orientation (target group-based) frequently on water use and sanitation technologies and treatment facilities;
d. Organize exposure (experience sharing and learning) visits on safe water supply and improved sanitation services; and
e. Develop a knowledge-based "cadre" (working team) for operation and maintenance of existing and new water supply and sanitation facilities.

5.3.4 Systemic issues

The SDG 17 calls for policy and institutional coherence, and multi-stakeholder partnership to mobilise and share knowledge, expertise, technology and financial support (Annex 1.3). Goal 17 further recognises the need for data, monitoring and accountability to understand progress on sustainable development. In line with this, MoWSS in collaboration with MoUD, MoFALD, MoH and MoPE is encouraged for policy coherence and municipalities should be engaged in:

a. revitalizing coordination mechanism to support works of municipalities and promote multi-stakeholder coordination and collaboration;
b. develop in-built mechanism in municipalities to collect disaggregated data based on monitoring results and analyze and share data timely;
c. develop measurements of progress on sustainable development that complement GDP and support capacity development;
d. promote information and communication technology (ICT) and e-governance as well as citizen-centric digital governance tools to strengthen institutional capacity of municipalities in delivering water and sanitation services; and
e. establish a mechanism for systematic follow-up and review of water and sanitation facilities in Kathmandu Valley.

Recalling 2011 Sanitation and Hygiene Master Plan, and 2016 Water Supply, Sanitation and Hygiene Sector Development Plan, steering and coordination committees are proposed. It has proposed to rename existing National Sanitation and Hygiene Steering Committee by National Water, Sanitation and Hygiene Steering Committee which will be chaired by the Secretary of MoWSS. A National WaSH Coordination Committee will be led by Joint-Secretary, MoWSS. It has renamed Municipal Water and Sanitation Coordination Committee by Municipal WaSH Coordination Committee which will be chaired by Mayor. The Sector Efficiency Improvement

Unit (SEIU) at MoWSS functions as the secretariats to WASH Steering Committee, and Coordination Committee.

The Municipality Level Water, Hygiene and Sanitation Coordination Committee led by Mayor should continue to function to implement this Strategy (Annex 3.4). The roles and responsibilities of the Committee are to, *inter alia*, prepare and update WASH profile, analyse issues and strategies, and conduct resource mapping and stakeholder analysis and prepare a joint plan of action and organise innovative and creative activities on sanitation and hygiene.

5.4Monitoring and evaluation

Monitoring is an essential component and acts as an early warning for any damages or non-functioning or poor functioning of water supply and sanitation services. It helps to determine the effects of facilities and ensures compliance of policy and regulatory measures. Monitoring generates meaningful information to meet the desired objectives of the intervention and provides information to decision-makers to expedite construction, operation and maintenance or "change the gear"of interventions (project or activity) by avoiding costly mistakes, if any.

Two types of monitoring will be required to achieve effective outcome of water supply and sanitation facilities in Kathmandu Valley, namely, performance monitoring and impact monitoring. The purpose of the former monitoring is to judge managerial capacity of Valley municipalities in implementing this Strategy and will provide updates on implementation status or "compliance". The latter monitoring will determine the impact of interventions and provides information on "effectiveness" of actions implemented. Competent institutions such as KVDA and KVWSMB may conduct surveillance monitoring to know the level of compliance. Municipalities in Kathmandu Valley are encouraged to have "in-built" monitoring system and KVDA and KVWSMB would focus on periodic evaluation of Strategy implementation.

The monitoring and evaluation reports should be periodically shared with relevant institutions. Municipalities, KVDA and KVWSMB are encouraged to develop activity specific indicators and means of verification. However, verification could be ensured through publication of documents.

The MoUD through its KVDA and DoUDBC should prepare and implement Local Sustainable Urban Development Agenda (LSUDA) in the spirit of the outcome document of Habitat III conference in collaboration with MoWSS, MoFALD, MoH, MoPE and all municipalities of Kathmandu Valley. This agenda should include decentralised monitoring system with measurable indicators and evaluation provisions with adequate consideration of multi-stakeholder engagement in implementation, resource generation, monitoring, supervision, and technical back-up facilities for Kathmandu Agenda (LSUDA).

5.5 Implementation approach

Nepal underscores the importance of providing safe drinking water and improved sanitation facilities since 1970s and has achieved significant process in MDGs. Necessary instruments are in place, such as policies, plans, programmes, standards, guidelines and framework on water and sanitation, including groundwater recharge, conservation of water sources, sludge management and wastewater treatment needs, including PPP model. Literature review revealed the demand for adequate water and sanitation infrastructures and integrated laws. Based on recent election manifesto, although not specific to Kathmandu Valley, political Parties have committed to provide

safe drinking water and improve sanitation facilities. In spite of several policy commitments, water supply and sanitation condition is far from satisfactory in Kathmandu Valley partly due to inadequate translation of commitments into action. By May 2017, elected Mayor and his/her team in 18 municipalities expedite socio-economic development and meet people's long-wait unmet needs in the Valley.

Municipalities have defined the required development activities. Effective implementation starts with planning and budget allocation, defining working modality and human resource availability. The Finance Minister through Budget Speech for Fiscal Year 2017/18 has directly allocated water and sanitation related budget to Local Levels. The district offices of water supply and sewerage are expected to provide technical support to these Local Levels to identify and allocate necessary budget on drinking water and sanitation services. Groundwater recharge, rainwater harvesting and conservation of springs, wells, spouts and ponds are much discussed with little budget allocation and work. Wastewater treatment policy was committed, however, 4 out of 5 the treatment facilities in Kathmandu Valley are currently non-functional. Faecal sludge management is yet to be in place and tanker water quality surveillance needs frequent checking for quality control. In order to ensure implementation of proposed strategic actions, the following approaches are proposed:

a. Encourage each municipality to select municipality-specific target-oriented activities and include them in annual plan with necessary budget and implementation responsibility to knowledge-based and dedicated human resources;
b. Organise orientation and/or workshop-training where necessary to inform decision-making level, and build and/or enhance capacity at working level;
c. Promote regular interaction and consultation on water supply and sanitation at ward or settlement level to support for local planning process and building capacity;
d. Establish and/or strengthen a section or division in each municipality to look after water and sanitation aspect or integrate them into environment division or department as appropriate to continuously engage in water supply and sanitation services; and
e. Encourage MoUDto prepare LSUDA for Kathmandu Valley in collaboration withMoWSS, MoFALD, MoH, MoPE KVDA, DoUDBC, KUKL, KVWSMB and municipalities to address SDGs and outcome of Habitat III conference;

This approach will promote institutional strengthening, using existing governance arrangements and where necessary to strengthen such arrangements. Similarly, it is proposed to follow the existing monitoring, evaluation, and reporting mechanism to avoid duplication of works. Result-oriented implementation of the Strategy provides a basis for its success and benefits to the target communities. It needs mobilisation, deployment and management of resources. It is equally important to lead the Strategy implementation process by the competent, knowledge-based and technically sound institutions such as MoWSS and MoUD and organisations under them.

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Annex 1.1

Draft Criteria for Municipalities, Sub-Metropolitan and Metropolitan Cities

SN	Criteria	Municipality	Sub-Metropolitan City	Metropolitan City
1	Population (at least) Himali areas of himali districts	Permanent resident 10,000	200,000	500,000
	Hill areas of himali and hill districts	31,000		
	Kathmandu Valley, Madesh and Tarai districts	60,000		
2	Internal revenue (last 5 years) in NRs Himali areas	10,000,000	250,000,000	1,000,000,000
	Other districts	30,000,000		
3	Minimum facilities	Road, electricity, drinking water, communication and similar facilities	Electricity, drinking water and communication services and black-topped main roads	At least 75% of black-topped road
4	Waste Management	Available	Wastes treatment and management system	
5	Open space and park garden	Available in each ward	Public garden	Sufficient recreation areas, and children park and recreation place for senior citizens
6	Hospital (at least)	25-beds hospital facility	100-beds one hospital and with 200-beds hospital facility	Hospital with expert service, 100-bed one general hospital and at least 500-bed hospital facility
7	Education		Facility for high level education and technical education	Post-graduate level education facility, and technical school
8	Bus park	Available		Bus park with terminal, sufficient parking, sub-way and roadside walking facilities
9	Transportation			City transportation and disable-friendly public transport facility, and access to international airport
10	Water supply and sanitation facility	Available		
11	Bank and finance institution service	Available		
12	Community building and conference hall	Community building and conference hall	City conference Hall	International level conference hall and exhibition place
13	Market area	Available		Managed vegetables and fruits centre and shopping malls
14	Museum			Available
15	Slaughter house	Available	Modern slaughter house	
16	Cremation place	Available	Managed cremation place	

17	Playground for sports	Available	National level playground and covered hall	International quality playground
18	Town master plan	Available		
19	Disable friendly		Public places disable-friendly buildings & access to physical facilities	
20	Hotels		Tourist quality hotel, motel and resort	International level hotel facility
21	Heritage conservation			Available of special importance
22	Prescribed other standards and other services	Available	Available	Dancing place, creative gallery, city greening and other facilities as prescribed

Source: Draft Local Level Governance Operation Bill, 2017 (Section 8)

Annex 1.2

Municipalities and Populations in the Kathmandu Valley

SN	District	Municipality	Area (km2)	Population	No. of wards
1	Lalitpur	Lalitpur Metropolitan City	36.12	284922	29
2		Godavari Municipality	96.11	78301	14
3		Mahalaxmi Municipality	26.51	62172	10
		Sub-total	**158.74**	**425395**	**53**
4	Bhaktapur	Changunarayan Municipality	62.98	55430	9
5		Bhaktapur Municipality	6.89	81728	10
6		MadhyapurThimi Municipality	11.47	83036	9
7		Suryabinayak Municipality	42.45	78490	10
		Sub-total	**123.79**	**298684**	**38**
8	Kathmandu	Kathmandu Metropolitan City	49.45	975453	32
9		KageshworiManohara Municipality	27.38	60237	9
10		Kirtipur Municipality	14.76	65602	10
11		Gokarneshwor Municipality	58.5	107351	9
12		Chandragiri Municipality	43.92	85198	15
13		Tokha Municipality	17.11	99032	11
14		Tarakeshwor Municipality	54.95	81443	11
15		Dakshinkali Municipality	42.86	24296	9
16		Nagarjun Municipality	29.85	67420	10
17		Budhanilkantha Municipality	34.8	107918	13
18		Shankarapur Municipality	60.21	25338	9
		Sub-total	**433.79**	**1699288**	**138**
		Total in Kathmandu Valley	**716.32**	**2423367**	**229**

Source: Nepal Rajpatra (Gazette), 10 March 2017

Annex 1.3

Sustainable Development Goals, Targets and National Indicators and Relevant Elements of New Urban Agenda

Global Goals

1. End poverty in all its forms everywhere;
2. End hunger, achieve food security and improved nutrition, and promote sustainable agriculture;
3. Ensure healthy lives and promote wellbeing for all at all ages;
4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all;
5. Achieve gender equality and empower all women and girls;
6. *Ensure availability and sustainable management of water and sanitation for all;*
7. Ensure access to affordable, reliable, sustainable and modern energy for all;
8. Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all;
9. Build resilient infrastructure, promote inclusive and sustainable industrialisation, and foster innovation;
10. Reduce inequality within and among countries;
11. *Make cities and human settlements inclusive, safe, resilient and sustainable;*
12. Ensure sustainable consumption and production patterns;
13. Take urgent action to combat climate change and its impacts;
14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development;
15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification and halt and reverse land degradation, and halt biodiversity loss;
16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels; and
17. Strengthen the means of implementation and revitalise the global partnership for sustainable development

Global Targets and National Indicators for Goals 6, 11 and 17

Goal 6: Ensure availability and sustainable management of water and sanitation for all

6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all

National Indicators

- 6.1a. By 2030, 95 % households with access to piped water supply
- 6.1.b By 2030, 99 %households with basic water supply coverage
- 6.1.c By 2025, 25.7 % households with *Escherichia coli* (*E. coli*) risk level in household water ≥ 1 colony forming unit (cfu)/100ml
- 6.1d By 2025, 22.2 % households with *E. coli* risk levels in source water ≥ 1 cfu/100ml
- 6.1e By 2030, 90 % population using safe drinking water

6.2 By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations

National Indicators

- 6.2a By 2030, 95 % households using improved sanitation facilities which are not shared
- 6.2b By 2030, 98 % population using latrines
- 6.2c By 2030, 99 % local authority areas that have declared open defecation free
- 6.2d By 2030, 99 % sanitation coverage
- 6.2e By 2030, 100 % urban households that have toilets connected to sewer systems

6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally

National indicators

6.3a Proportion of untreated domestic waste water (%)
6.3b Proportion of untreated industrial waste water (%)

6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity

National indicators

6.4a Wastage of water while using it (per person/day in litres)
6.4b Availability of freshwater (per person/day in litres)
6.4c Availability of freshwater (per person/day in litres) within 30 minutes walk in rural areas

6.5 By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate

6.6 By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes

6.a By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies

6.b Support and strengthen the participation of local communities in improving water and sanitation management

Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable

11.1 By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums

National indicators

11.1a By 2030, 125 thousands population living in slums, and squatters
11.1b By 2030, 0.1 % urban population living in squatters
11.1c By 2030, 5 % household units roofed with thatched/straw roof
11.1d By 2030, 11 % multidimensional poverty
11.1e By 2030, 60 % households living in safe houses

11.2 By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations women, children, persons with disabilities and older persons

National indicators

11.2a By 2030, 50 % availability of safe roads
11.2b By 2030, 50 % availability of safe public transport
11.2c By 2030, 80 % access to a road within 30 minutes of walking

11.3 By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries

National indicators

11.3a By 2030, 50 planned satellite sites (number)
11.3b By 2030, 20 % households residing with 5 or more persons
11.3c By 2030, growth of urban population by 2.5 % per annum

11.4 Strengthen efforts to protect and safeguard the world"s cultural and natural heritage

National indicators

11.4a By 2030, NPR 2 million budget allocated for the protection of natural and cultural heritage

11.4b By 2022, 870 earthquake damaged cultural and religious heritage to be constructed (number)

11.5 By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations

National indicators

11.5a By 2017 and 2020, 285 and 71 thousands houses fully damaged due to earthquake to be constructed respectively

11.5b By 2017 and 2020, 147 and 37 thousands houses partially damaged due to earthquake to be constructed respectively

11.5c By 2017 and 2020, 2802 and 701 health facilities fully damaged due to earthquakes to be reconstructed respectively

11.5d By 2017 and 2020, 662 and 166 health facilities partially damaged due to earthquakes to be reconstructed respectively

11.5e By 2017 and 2020, 978 and 244 central, district, municipal and village structures fully or partially damaged due to earthquakes to be reconstructed respectively

11.5f By 2017 and 2020, 5023 and1256 death due to earthquake disaster respectively

11.5g Deaths due to other natural disaster (number) – not specified

11.5h By 2017 and 2020, 12743 and13186 injuries due to earthquake disaster respectively

11.5i Injuries due to other natural disasters (number) – not specified

11.6 By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management

National indicators

11.6a By 2030, 115 (averaging period 24 hours) concentration of total suspended particulates

11.6b By 2030, 50 (averaging period 24 hours) concentration of particulate matter10 (PM 10) ($\mu g/gm^3$) (micrograms per cubic meter)

11.6c By 2030, 20 (averaging period 24 hours) concentration of particulate matter2.5 ($\mu g/gm^3$)

11.6d By 2030, 70 (averaging period 24 hours) concentration of sulphur dioxide ($\mu g/gm^3$)

11.6e By 2030, 71 (averaging period 24 hours) concentration of nitrogen dioxide ($\mu g/gm^3$)

11.6f By 2030, 10,000 (averaging period 24 hours) concentration of carbon monoxide ($\mu g/gm^3$)

11.6g By 2030, 0.5 (averaging period 12 hours) concentration of lead ($\mu g/gm^3$)

11.6h By 2030, 120 (averaging period 8 hours) concentration of ozone ($\mu g/gm^3$)

11.6i By 2030, 100 % municipalities with sewerage services

11.6j By 2030, 100 % private hospitals segregating wastes

11.7 By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities

National indicators

11.7a Open spaces in urban areas accessible to all (%) – not specified

11.a Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning

11.b By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030, holistic disaster risk management at all levels

11.c Support least developed countries, including through financial and technical assistance, in building sustainable and resilient buildings utilizing local materials

Goal 17: Strengthen the means of implementation and revitalise the Global Partnership for Sustainable Development

Finance

17.1 Strengthen domestic resource mobilisation, including through international support to developing countries, to remove domestic capacity for tax and other revenue collection

17.2 Developed countries to implement fully their official development assistance commitments, including the commitment of many developed countries to achieve the target of 0.07 % of gross national income (GNI) for official development assistance (ODA) to developing countries and 0.15 to 0.20 % of ODA to least developed countries (LDCs); ODA providers are encouraged to consider setting a target to provide at least 0.20 % of ODA/GNI to LDCs

17.3 Mobilise additional financial resources for developing countries from multiple sources

17.4 Assist developing countries in attaining long-term dept sustainability through coordinated policies aimed at fostering debt financing, debt relief and debt restructuring, as appropriate, and address the external debt of highly indebted poor countries to reduce debt distress

17.5 Adopt and implement investment promotion regimes for LDCs

Technology

17.6 Enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation and enhance knowledge sharing on mutually agreed terms, including through improved coordination among existing mechanisms, in particular at the United Nations level, and through a global technology facilitation mechanism

17.7 Promote the development, transfer, dissemination and diffusion of environmentally sound technologies to developing countries on favourable terms, including on concessional and preferential terms, as mutually agreed

17.8 Fully operationalise the technology bank and science, technology and innovation capacity-building mechanism for LDCs by 2017 and enhance the use of enabling technology, in particular information and communications technology

Capacity building

17.9 Enhance international support for implementing effective and targeted capacity-building in developing countries to support national plans to implement all SDBs, including North-South, South-South and triangular cooperation.

17.16 Enhance the Global Partnership for Sustainable Development, complemented by multi-stakeholder partnerships that mobilise and share knowledge, expertise, technology and financial resources, to support the achievement of the SDGs in all countries, in particular developing countries

17.17 Encourage and promote effective public, public-private and civil society partnerships, building on experience and resource strategy of partnerships

Note: National indicators have yet to be set set for Goal 17 and refined for Goals 6 and 11.

Elements of New Urban Agenda

Our principles and commitments

Para 14.a: Leave no one behind, ... providing equal access for all to physical and social infrastructure and basic services as well as adequate and affordable housing ...Para 15.c: adopt sustainable, people-centred, age- and gender-responsive and integrated approaches to urban and territorial development by implementing policies, strategies, capacity development, and actions at all level ...

Call for Action

Para 33: stimulate the supply of a variety of adequate housing options that are safe, affordable, and accessible for members of different income groups of society, taking into consideration socio-economic and cultural integration of marginalized communities ...

Para 34: promote equitable and affordable access to sustainable basic physical and social infrastructure for all, ... including affordable serviced land, housing, modern and renewable energy, safe drinking water and sanitation, safe, nutritious and adequate food, waste disposal, ...information and communication technologies ...

Para 63: cities and human settlements face unprecedented threats from unsustainable consumption and production patterns, loss of biodiversity, pressure on ecosystems, pollution, and natural and man-made disasters, and climate change and its related risks, undermining the efforts to end poverty in all its forms and dimensions and to achieve sustainable development ...

Para 74: promote environmentally sound waste management and to substantially reduce waste generation by reducing, re-using, and recycling (3Rs) of waste, minimizing landfills, and converting waste to energy when waste cannot be recycled or when it delivers the best environmental outcome ...

Para 91: support local governments in determining their own administrative and management structures, in line with national legislation and policies, as appropriate, in order to adapt to local needs, and encourage appropriate regulatory frameworks and support to local governments in partnering with communities, civil society, and the private sector to develop and manage basic services and infrastructure ....

Etc

Source

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Annex 1.4

Consultation Meeting on Urban Water and Sanitation in Kathmandu Valley

Organised by KVDA and UNESCAP

12 April 2017, Wednesday

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Annex 1.5

Sub-Regional Workshop on Urban Water and Sanitation Services in South and South-West Asia

9-10 August 2017 (Wednesday-Thursday)
Hotel Shankar, Kathmandu

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Annex 2.1

Major Projects under implementation in Kathmandu Valley

1. The ADB-supported Kathmandu Valley Water Supply Improvement Project (April 2015 to December 2020) aims to improve the efficiency and reliability of the water supply system by expanding existing reservoirs, and providing water connections at household level. Prior to this, ADB-supported the Kathmandu Valley Drinking Water Service Development Project (2004-2014) that which enhanced the capacity of KUKL to update its services.

2. The Kathmandu Valley Wastewater Management Project (April 2013 to June 2019) invests in rehabilitating and expanding the sewerage network, modernizing and expanding wastewater treatment plants, and improving wastewater management facilities.

3. The Melamchi Water Supply Project (December 2000 to December 2016) aims to reduce water shortage in Kathmandu Valley with components of infrastructure development, social and environmental support, institutional reforms, and project implementation support. The Project will provide 190 million litres of clean water and includes a component of water treatment before its supply. This project is still under construction with support from ADB, NORAD, JICA and OPEC.

4. The Project on Hydro-microbiological Approach for Water Security in Kathmandu Valley (2014-2019) under implementation with support from JICA aims to study the existing sources and conditions of pollutants in the Valley"s water sources, predict future demand for water, and develop and evaluate an appropriate treatment system.

5. Global Sanitation Fund (2010-2017) aims to help the government achieve the national goal of universal sanitation coverage by 2017.

6. HPCODBC implemented Bagmati Improvement Project under implementation has concentrated its activities to regulate water flow in the Bagmati River through bank protection activities using bio-engineering and beautification in the river corridor.

7. The ADB-supported Bagmati River Basin Improvement Project has a vision of making the Kathmandu river system *"a clean, green and healthy system that is full of life and valued by all*." This project has adopted the Integrated Water Resources Management (IWRM) approach and principles, considers the Bagmati Action Plan (2009) as the road map, and will focus on wastewater treatment facilities, including rainwater harvesting, and groundwater recharge. This Project aims to engage NGOs watershed management, rainwater harvesting, and waste management.

8. The UN-ESCAP supported decentralised wastewater treatment system/facility was piloted in *Sathya Sai Shiksha Sadan*, Tokha in 2014. It has proven to be a very successful and practical approach of improving sanitation conditions and increasing water availability. The pilot serves as a demonstration site for learning rainwater harvesting and DEWATS. It includes the following components:
   - Wastewater treatment – construction of treatment pond, recycling of water, and distribution of water to toilets and gardening;
   - Rainwater harvesting – development of rainwater collection facilities in building terraces, piping, construction of underground/storage tank, pumping equipment, aeration facility, distribution system, and pipes within the school premises; and
   - Greenery expansion – plantation of locally suitable medicinal and aromatic plants, and gardening including perforated paving in outdoor circulation area.

9. A number of annual activities related to water and sanitation are being implemented by organizations such as UN-Habitat and NGOs.

Annex 2.2

Good Practices in generating resources

Generating Resources

Nepal has introduced integrated property tax (IPT) to generate domestic resources for municipalities to implement local development activities. This provides the municipalityto collect revenue and other sources such as grants from central government, local development fees, loans from public and private sources, savings from previous years" budget and locally raised revenue from taxes, fines and user"s charges (MoUD, 2016). Municipalities have nearly 50 % of the total income sources from grant of central government. Municipalities have practised collection of revenue using house and land tax (HALT) which is levied upon the net value of house and land plot whereas IPT system taxes land and building together based on total net valuation of the property. The IPT system was piloted in Dharan and Butwal in 2000 and replicated in other municipalities. It has replaced the HALT approach of revenue collection. The IPT has made local people more responsible towards the tax payment (MoUD, 2016). IPT system in municipalities has confirmed increase of municipal revenue. This practice of generating municipal revenue might contribute to allocate necessary fund for water supply and sanitation activities.

Eco-efficient Infrastructure in School

Rainwater harvesting (RWH) has been developed in the Sathya Sai ShikshaSadan (SSSS) with support from ESCAP to make the school self-sufficient in water for drinking, washing utensils and clothes, bathing and other uses. The DEWATS in SSSS has demonstrated and encouraged schools and other institutions and private sector to benefit from RWH by improving sanitation and hygiene situation.

Piloting of an eco-efficient water infrastructure in SSSS was initiated in 2014 with the objectives of: (i) enhancing understanding of local policymakers on eco-efficient infrastructure in the context of sustainable urban development; (ii) promoting integration of eco-efficiency into local infrastructure development plans and strategies; and (iii) identifying local strategies and policy options to address water-energy challenges through eco-efficient infrastructure development (Uprety, 2014). This included three major components: (i) wastewater treatment – construction of treatment system, recycling of water, distribution of water to toilets and gardening; (ii) rainwater harvesting – development of rainwater collection facilities, piping, construction of underground/storage tank, pumping equipment, distribution system and pipes within the school premises; and (iii) development of greeneries including perforated paving in outdoor circulation area. This project has also prepared an operational manual to support the school in continuously managing the rainwater harvesting, and wastewater treatment facilities. Students have benefitted from practical knowledge.

Generating Electricity from Municipal Wastes

The Kathmandu Metropolitan City (KMC) has generated 14 kW of electricity from 3 tonnes of solid wastes on 27 June 2017at its waste management centre at Teku through a "bio-methanisation plant" with support from European Union. A turbine has been joined to generate electricity. This plant generates 300 kg (3 quintal) bio-fertiliser, 96 kg of biogas and 500 litre of treated water. This plant will reduce 2500 tonnes of CO_2-eq emission reduction annually. Nepal Investment Board is planning to operate a larger project of this kind in collaboration with the private sector to manage solid wastes in the Valley.

Nepal has received assistance from Climate Investment Fund, as one of the six pilot countries, for Scaling-up Renewable Energy Programme in Low Income Countries (SREP). SREP aims to demonstrate the social, economic and environmental viability of low carbon development pathways in energy sector. Under this programme, Nepal is planning to implement innovative and private sector-led Waste to Energy and Resource Recovery Programme to recover energy, mostly biogas from municipalities and institutions to convert wastes to energy with economic and environmental benefits.

Annex 3.1

Highlights of relevant policies, strategies and plans

The Fourteenth Plan

The Fourteenth Plan (2016/17-2018/19) has a vision of improving health and lifestyle of the people by providing accessible, reliable, and quality drinking water and sanitation services. The Plan aims to provide basic drinking water and sanitation services to all, and expand medium and high quality services in this Plan period. The Plan has a strategy of providing basic drinking water and sanitation and toilet services to the entire population, conserving traditional sources of water and watersheds, arranging for groundwater recharge and prioritizing sewerage and waste management activities with urban and semi-urban areas.

The three-year Plan commits to:

a. implement "one house one toilet policy" and construct public toilet in public places;
b. promote rainwater collection and use, implement effectively the regulatory provision on groundwater abstraction, and promote DEWATS for the cleanliness and conservation of rivers;
c. also implement drinking water and sewerage-related projects in urban areas with co-investment of users, and rainwater collection and use; and
d. continue sewerage management project in Kathmandu Valley, and construct and operate sanitary wastewater and treatment system to make the Bagmati River sewer free (NPC, 2017).

Effective implementation of the Plan is expected to provide drinking water services to 90 % and basic sanitation services to 89 % of the total population by the end of the Plan period (FY 2018/19).

National Urban Development Strategy

The 2017 National Urban Development Strategy addresses systems, infrastructure, environment and economic issues and calls for an integrated approach to manage sewers and sanitation facilities. The Government has also launched "safasahar" (clean city) programme with 5 integrated elements namely waste management, water and wastewater management, greenery promotion, pollution control, and city beautification (MoUD, 2017). The Strategy has a "Vision 2031: Balanced and Prosperous National Urban System" which encompasses physical and institutional development, and enhancement in the quality of urban living. The Strategy outlines 5-year milestones for putting policies, plans, guidelines, and regulations in place; 10-year milestones for operationalising plans, programmes, and projects with increased investment in urban development and strengthened inter-urban and urban-rural linkages; and 15-year milestones that ensure urban centres with improved infrastructure, healthy environments, efficient management, and vibrant economies (MoUD, 2017).

This Strategy focuses to promote environment, heritage and tourism-friendly economic activities in Kathmandu Valley as one urban area, and de-concentrate incompatible functions outside the Valley. The Urban Development Strategy has identified three major issues: (i) poor coverage of piped water with sub-standard water quality; (ii) insufficient or non-functional wastewater treatment plants; and (iii) households without toilets and sanitation facilities. On water provisioning, the desired condition is to provide 100 lpcdfor consumption, and increase access of piped water supply to 100 % in urban areas. The key strategies on water supply and sanitation, and solid waste management are as follows (MoUD, 2017):

1. **Water security:** project and manage fresh water sources; institutionalise in-built rainwater harvesting in the building permit system; and also institutionalise water recharge provisions in public spaces.
2. **Water Safety**: strengthen system to produce and deliver safe water; internalise regular monitoring system to assure Nepal Water Standard in place; build community water storage facilities in place for emergency purposes.

3. **Water provisioning**: augment investment in increasing coverage and quantity of water supply, protect and manage freshwater sources, and facilitate and encourage private sector involvement in water supply.
4. **Sanitation**: Enhance awareness and incentives for building toilets; and augment investment in building wastewater treatment system and promote on-site treatment of wastes and stormwater drainage.
5. **Solid waste collection**: encourage community-led waste segregation and collection; and promote public-private partnership in waste collection and management.
6. **Sanitary landfill site**: adopt sanitary landfill site as transitional strategy to reach condition of 3R (reduce, reuse and recycle).
7. **Reduce, reuse and recycle**: promote/mandate 3R at household and community level; and incentivise private sector to reuse and recycle waste through appropriate technologies.
8. **Solid waste management unit**: establish dedicated and capacitate SWM unit in all municipalities; and delineate institutional responsibility and accountability at central level with respect of SWM.

On finance, the Strategy proposes to enhance mobilisation of Own Source Revenue (OSR) to address water supply and sanitation challenges in urban areas.

Kathmandu Valley Strategic Development Master Plan

The KVDA, in its draft *Vision 2035 and beyond: 20 years strategic development master plan (2015-2035) for Kathmandu Valley*, has expressed its vision to *make Kathmandu Valley a safe, clean, organised, prosperous and elegant (SCOPE) national capital*. In this Master Plan, KVDA has emphasized the need for developing integrated urban services through public-private partnerships and has realised insufficient supply of water due to unsustainable groundwater extraction and lack of rainwater harvesting and conservation. In addition, quality of drinking water is unsatisfactory. Domestic and industrial wastes are not segregated and properly disposed, and some wastewater treatment facilities are non-functional. Faecal sludge is primarily managed through on-site systems, such as soak pits or septic tanks, or through off-site disposal that has public health impacts. Non-functional sewers, inadequate storm water and solid waste management, and direct disposal of wastes into rivers and surface water bodies have compounded the water and sanitation problems in the Valley. The draft Master Plan calls for improving wastewater management capacity, maximising efficiency and effectiveness of existing sewer systems, strengthening sewerage infrastructure and services, preventing drinking water pollution, and improving river water quality.

Sector Development Plan

The 15-year Water Supply, Sanitation and Hygiene Sector Development Plan (SDP, 2016-2030), issued by the Ministry of Water Supply and Sanitation, has identified 11 themes[5]. This provides a basis to implement National Urban Water Supply and Sanitation Policy (2014) as well. The SDP (2016) underscores the importance of converging implementation of all WASH activities under a single Ministry by engaging all sector actors – government, non-governmental and private sectors for delivery services effectively and efficiently. WASH is an immediate priority after any disaster. Inadequate WASH services can accelerate disaster and disaster also degrades WASH services. The 2015 earthquake affected number water supply systems and degraded sanitation conditions, including destruction of toilet facilities. The SDP realises the need for considering "water as a commodity" to encourage and attract private sector in WASH as public sector investment alone would be inadequate in meeting the sector targets – service levels and coverage (MoWSS, 2016). Estimated budget for SDP implementation totals to about NRs 697 billion at 2016 price (US$ 1 = NRs 100) and NRs. 1598 billion at inflated cost (inflation rate of 9.5%).

[5] (i) Access and utilisation; (ii) functionality and sustainability; (iii) innovation and technology adaptation; (iv) ecosystem and water production; (v) WASH governance, institutional set-up and capacity building; (vi) WASH diplomacy; (vii) monitoring and evaluation; (viii) continuous quality and service improvement; (ix) diversity and inclusion; (x) WASH in special situation; and (xi) sector financing

The SDP has a vision of "improving public health and living standard of people though safe, sufficient, accessible, acceptable and affordable water, sanitation and hygiene services – any time, everyone and everywhere" (MoWSS, 2016). Its mission is to have an effective, responsive, transparent and accountable WASH sector with one legislation, one policy framework, one SDP executed by one Ministry and one WASH performance report to realise the vision. The key objectives of the SDP are to: (i) enable provision of basic water and sanitation facilities for all, as well as service improvement through improved sector governance and effectiveness; (ii) address all current sector issues and future developments in the sector; (iii) articulate the sector priorities, strategies and actions for effective programming and implementation of WASH in a coherent and harmonized manner, and gradual sector convergence; (iv) guide and align all sector actors with national priorities, strategies, standards and procedures in the effective programming and management of WASH services; and (v) put in place an enabling policy, legislative and regulatory framework, a clear institutional framework for service delivery, financing arrangements, capacity building, improved coordination and performance monitoring It ensures that all citizens in Nepal have functional and sustainable access to WASH services that align with SDGs.

The SDP focuses on management of excreta and urine, and separation of grey water and solid wastes to provide improved sanitation services. This includes, at least one or more toilets/family, and safe disposal of wastes.

Sanitation and Hygiene Master Plan

The Sanitation and Hygiene Master Plan (2011) has a goal of achieving universal toilet coverage by 2017 by creating an enabling environment and collaborative efforts of multi-stakeholders such as government, local bodies, UN agencies, bilateral agencies, I/N-NGOs and civil society organisations, private institutions, and the media. The Master Plan aims to: (i) develop necessary mechanism to maintain uniformity and standards in approaches and modalities; (ii) also develop institutional arrangement at all levels; and (iii) strengthen resource pooling and cost-sharing arrangements and through participatory planning process. The Master Plan adopts ODF as the bottom line, universal access to sanitation, technology choices for household toilets (low cost, hygienic, users-friendly and sustainable), local level (municipality) leadership, locally managed financial support mechanism, and mandatory provision of properly designed toilets and sanitary systems in new built-up areas/building, and hand washing with soap as guiding principles (GoN, 2011).

Operational strategies include: (i) local bodies to lead participatory planning, implementation and monitoring; (ii) participatory approach for effective, inclusive, gender-sensitive and sustainable hygiene and sanitation; (iii) demand-driven implementation; (iv) reward and recognition; (v) identification and mobilisation of financial resources, including establishment of Municipality Fund; and (vi) urban sanitation with focus on cost-effective and cost-sharing sanitation facilities and services, including storm water drainage. For effective waste management, the Master Plan underscores the importance of adopting decentralised sanitation options, minimising solid wastes at source, designing waste management system with repair and maintenance provisions, promoting greater participation of local communities, recycling and composting and also adopting "polluter pays principle". The Master Plan targets for all houses to have access to improved sanitation facilities (toilets) with full use, operation and maintenance (GoN, 2011). Municipalities will identify and implement various hygiene and sanitation parameters and indicators during the post-ODF to achieve total sanitation situation.

Urban Water Supply and Sanitation Policy

The National Urban Water Supply and Sanitation Policy (2014) adopted a goal of ensuring socio-economic development, improving health status and quality of life of urban population. The Policy targets the poor and marginalised for sustainable water supply and sanitation services and protection of the environment.
The Urban Water Supply and Sanitation Policy (2009) urged for utilisation of safe, reliable and adequate services and partnership arrangement with private sector and/or users in managing water and sanitation

services. The Policy provides opportunities for effective programming and implementation through integrated water supply and sanitation sector projects.

Groundwater Resource Management Policy

The Groundwater Resource Management Policy (2012) recognises that groundwater recharge is currently insufficient compared to its withdrawal, leading to issues of both quantity and quality. Inadequate supply of drinking water has accelerated the use of deep and shallow tube wells to meet the growing demands of an increasing population in Kathmandu Valley(GoN, 2012).The Government has formulated this policy with the objectives of conserving, utilising and managing groundwater resources sustainably through recharge and pollution reduction measures. The policy attempts to reduce dependency on groundwater resources by creating categories of commercial and non-commercial use, and adopting regulatory measures respectively. The policy calls for ground water recharge through regulating activities that impact recharge, such as conserving and managing streams, rivers, stone taps, ponds and wells, promoting treatment and reuse of domestic grey water (except toilet), and relocating water polluting industries outside Kathmandu Valley. This policy also provides for issuing permits and/or licences to service providers using shallow (<30m depth) and deep bore(>30m depth) drinking water. All service providers must get permission (licence) from Kathmandu Valley Water Supply Management Board and renew each year. The Policy emphasises water recharge through rainwater collection, widening of surface area, and/or injection of wells. The policy also outlines short-, medium- and long-term activities in order to meet its objectives.

The Build-Operate-Transfer Policy (2000) initiated the concept of public-private partnership for urban infrastructure development. The National Solid Waste Management Policy (1996) urges local bodies (includes municipalities) to engage in waste management, mobilise waste as resource (3R approach) and enhance local participation in waste management. A Policy on NGO Participation in WatSan Programmes (1996) provides opportunities to involve relevant NGOs in designing and implementing water supply and sanitation facilities.

Total Sanitation Guidelines

A number of guidelines have been developed to operationalise policies and strategies. The Total Sanitation Guidelines (2017) has a mission to provide sanitation to all for all time by 2030. It aims to maintain sustainability of ODF, change attitude on sanitation and cleanliness, ensure safe drinking water, promote water treatment at domestic and institutional levels, and reuse wastes to the extent possible and/or to meet the prescribed standard.

The total sanitation campaign focuses on improving/maintaining a “safe and clean” area by promoting toilets, personal hygiene, access to safe water, clean houses, and management of solid and liquid wastes, sewerage, and environmental sanitation (MoWSS, 2017).The Guidelines outline indicators, roles and responsibilities for multiple stakeholders. Municipalities are made responsible for formulating and implementing strategic action plans, managing budgets and human resources, and providing leadership, coordination, information and documentation, including monitoring, regulatory and supervisory functions (MoWSS, 2017).

Faecal Sludge Management Framework

The Institutional and Regulatory Framework on Faecal Sludge Management (2017) underscores the urgency of managing faecal sludge and defines roles and responsibilities of relevant organisations/stakeholders in faecal sludge management. The framework opens avenues for the formulation, implementation and monitoring of faecal sludge management in urban areas (MoWSS, 2017). The MoWSS is responsible for providing policies and guidelines, ensuring coordination, and functioning as regulator and monitor. The municipalities will be engaged in all activities related to guidance, coordination, technical support, collection and transportation, treatment, final discharge or utilisation, and in regulating, enhancing capacity and monitoring of faecal sludge. MoFALD, MoPE, MoAD, local

government, drinking water users and sanitation committees, private sector, international and national NGOs and development partners have also specified roles and responsibilities in managing the faecal sludge (MoWSS, 2017).

Municipalities may take technical and management support from MoWSS and DoWSS, local governance from MoFALD, involve water users and sanitation committees, private sector (as per Section 116 of Local Self-Governance Act, 1999) etc in managing sludge. The Framework also provides guidance on faecal sludge collection, transportation, treatment, discharge and final use. It provides guidelines for environmental monitoring and compliance, including compliance of generic standards on tolerance limits for industrial effluents to be discharged into inland surface waters, public sewers, and from combined wastewater treatment plant (MoWSS, 2017).

Groundwater Extraction and Utilisation Permit Guidelines

The Groundwater Extraction and Utilisation Permit Guidelines (2014) has provisioned for issuing licence for groundwater extraction and utilisation aimed for individual, industrial, commercial, public and other uses (KVWSMB, 2014) and has been issued to effectively implement the 2012 groundwater policy. The licensee is made responsible for managing groundwater recharging facilities. The licensee can extract water at different rates, depending on how an area is categorized. The rates are 2 to 15 litre/second, 2 to 7 lps and 2 to 3 lps for safe zones, semi-critical areas, and critical areas respectively.

Urban Environment Management Guidelines

The Urban Environment Management Guidelines (2012, 2068 BS) provides guidance on standards of wastewater and solid wastes before their discharge and disposal.

Water Supply Service Operation Guidelines

The Government has issued the Water Supply Service Operation Guidelines (2012) to monitor, evaluate, supervise, regulate and coordinate activities of drinking water service providers and to ensure quality water supply regularly in a transparent manner with full responsibility. The Department of Water Supply and Sewerage carries out these activities. The service provider should take prior approval of the Department to change, and/or expand existing water supply infrastructures and should inform fees collected from consumers. The Government has also issued Water Supply and Sanitation Co-investment Project Implementation Guidelines in 2011 to promote co-investment in water supply and sanitation projects of small urban areas, and existing and new constructed or under-construction projects that also provide water to district headquarters.

Sustainable Development Agenda of Nepal

In 2003, Sustainable Development Agenda of Nepal (SDAN) set a number of broad goals including one that *every citizen has easy access to adequate amounts of clean water, nutritious food, and clean air* (NPC/MoPE, 2003). The SDAN has objectives of providing all people with access to safe drinking water and to adequate sanitary facilities and reducing waste volume by 2017 and increasing reuse and recycling. It was realised that rivers downstream of cities have become increasingly contaminated by raw sewage and industrial effluents. Public health is increasingly threatened from surface water used for drinking. Access to adequate water is an acute problem in the Kathmandu Valley, and providing adequate quantities of safe drinking water to all households is of utmost priority. The SDAN calls for operation of wastewater treatment plants, collection for recycling or reuse of inorganic materials. The Government committed through SDAN to facilitate establishment of recycling plants and hazardous waste management centres and only dispose non-recyclable waste in environmentally sound sanitary landfills.

Annex 3.2

Legal Provisions on water supply and sanitation

The Nepal Water Supply Corporation Act (2007 with its amendments), Water Supply Management Board Act (2006), and Water Supply Tariff Fixation Commission Act (2006) provide provisions to improve water and sanitation services in Kathmandu Valley. The Water Supply Tariff Fixation Commission Act (2006) may constitute a Commission and authorises it to fix tariffs that service providers charge. The Commission is also empowered to monitor services provided by service provider to ensure compliance with standards.

The Water Supply Management Board Act (2006) provides provision to constitute an autonomous Board to regulate, manage, maintain quality and provide safe drinking water and sanitation services in municipalities. The Board has function, duty and power, in construction, expansion, improvement and rehabilitation of service system. The Board would regulate misuse and pollution of drinking water, and may conduct study, research and inventory of drinking water sources, distribution and sanitation. The Board may form sub-committees with representations from expert, service providers and consumers. As per the provision of this Act, the Kathmandu Valley Water Supply Management Board has been established to supply water regularly in a managed and effective manner in municipalities of the Kathmandu Valley. Furthermore, the Act empowers the Board to issue license to public or private service providers for system management, operation and maintenance, and also leasing the property.

The Water Tax Act (1966) provides provisions on levying the tax to each person that has a tap registered, and may stop distribution of water if the tax is not paid on time. The Water Resources Act (1992) clarifies order of priority of water uses, vests ownership of all water bodies in the Nation and has provisions for, *inter alia*, licensing, prohibiting water pollution, and transferring ownership of completed projects to user"s association. The Act has first priority for "drinking water and domestic uses" followed by irrigation, agricultural uses, and hydro-electricity.

Municipality works under the Local Self-Governance (LSG) Act (1999). The Town Development Fund (TDF) Act (1997) led to the establishment of the Town Development Fund to provide financial and technical support to municipalities undertaking development programmes and projects. The KVDA Act (1988) has provisioned KVDA to function as an umbrella planning body in Kathmandu Valley. The Land Acquisition Act (1977), Public Roads Act (1974), Town Development Act (1988), Ownership of Joint Housing Act (1997), Building Act (1998), and LSG Act (1999) provide provisions to acquire land for public use, including planned urbanisation, development and improvement of public roads, and promote group housing in high density urban areas, regulate building construction works, and define the role of local bodies for effective and efficient provision of services and facilities to the people (MoUD, 2016).

The Environment Protection Act (1996) and its Rules (1997), and Local Self-Governance Act (1998) and its Rules (1999) have provisions, for water conservation and sanitation improvement, development of sewer system, collection, disposal and management of wastes.

In order to enforce the legislative provisions, the Government has enacted relevant Rules. The Kathmandu Valley Water Supply Management Board Rules (2007) empowers the Board to monitor quality of supplied (piped) water and services of the service providers, regulate groundwater extraction and use, and collect fee from service providers and users.

The Drinking Water Rules (1998) provides multiple opportunities to regulate use of drinking water, engage community users in drinking water management and use, issue license on drinking water use, control water pollution, and maintain and/or improve drinking water standards.

The Drinking Water Service Charge (Recovery) Rules (1994) provides detailed procedures for tap connections, hole changes, ownership of taps, transfer of ownership, metering, and fixing charges/fees.

The National Building Construction Code (2003) provides guidance to manage household wastes and wastewater, rainwater collection, toilet construction and other sanitation services in the urban areas.

In order to simplify and guide operational issues on water supply and sanitation facilities, the Government has issued Guidelines to address ongoing and emerging challenges. The Drinking Water Service Operation Guidelines (2012) provides guidance on monitoring, evaluation, supervision, regulation, and coordination of drinking water service providers in order to maintain quality, regularity, transparency and responsive services. The Department of Water Supply and Sewerage coordinates activities of the service providers. The service providers shall not damage, transfer, sell, or use for other purposes any property used in drinking water distribution. The service provider shall ensure that its services are accessible to all people.

The Government has introduced a system of Minimum Conditions and Performance Measures (MCPM) in the local bodies (municipalities) in the Fiscal Year 2007/08 that includes their bare minimum functions to get performance-based municipal block grants. The MCPM Assessment Manual of Municipality (2009) has included urban basic services and indicators, including on sanitation and waste management, environment management, and public health promotion. In order to secure scores and be eligible for block grants, the municipality has to perform activities such as inclusion of waste management in its annual programme, segregation and separate collection of biological and non-biological wastes, mobilisation of private sector/communities in waste management, operation of landfill site, reuse and treatment of wastes, establishment of environment section, provision for special fund for environmental conservation, toilets in bus parks with water supply and electricity, and toilet promotion and implementation of ODF activities (LBFCS, 2014).

The Government of Nepal has issued National Drinking Water Quality Standards (NDWQS 2005) as per the Water Resources Act (1992). The Ministry of Health and Population (Ministry of Health after September 2015) released a National Drinking Water Quality Surveillance Directive in 2014 to conduct quality control surveillance. The water suppliers are required to test drinking water regularly and maintain the quality as per NDWQS, and conduct quality assurance of distributed water (MoHP, 2014). The NDWQS (2005) provides concentration limits of physical, chemical and microbiological parameters to evaluate the quality of water used for drinking purposes. The water suppliers should submit and implement the water quality improvement programme to comply with the standards (MoPPW, 2005).

The Government has released Water Supply and Sanitation Cost-sharing Guidelines in 2013 which includes drinking water and sanitation projects of small towns, and district headquarters. The cost-sharing approach as conceived in Rural Water Supply and Sanitation Policy (2004) may be implemented for water supply, sanitation, public awareness, and capacity enhancement programmes. The cost sharing guidelines suggests 40:60 ratio for user committee and Government support in expanding services of existing drinking water project, and 20:80 in a project requiring extended treatment and establishment of water analysis laboratory and more than 20 km in transmission pipeline.

The Government has issued three directives (co-financing in WatSan projects, dry-area WatSan project implementation, and WatSan service operators" directives) in 2012 to improve the level of services in emerging towns and technologically complex projects through cost sharing between Government and users. The directives provide guidance for services in dry-areas, and provisions for inspection, monitoring, and supervision to regulate work of the service providers. These legal instruments, codes, directives and guidelines provide multiple avenues to enhance water supply and sanitation services in the Valley.

Annex 3.3

Functions of water supply and sanitation related Institutions

Based on the Business Allocation Rules of Nepal (2015), 31 ministries (including Office of the Prime Minister and Council of Ministers) are promoting, facilitating and regulating social, economic and environmental securities to Nepalese people. The GoN has established a dedicated Ministry of Water Supply and Sanitation on 24 December 2015. This Ministry has the responsibility of formulating, implementing, monitoring, regulating and evaluating policy, plan and programme related to drinking water, sanitation and sewerage which contributes to SDG 6 targets (GoN, 2015). It provides guidance to KVDA, KVWSMB, KUKL, Kathmandu Valley Water Supply and Sanitation Project Implementation Directorate, Nepal Water Supply Corporation, Melamchi Drinking Water Development Committee and Melamchi Drinking Water Project and other similar projects, including Drinking Water and Tariff Fixing Commission. The implementing arm of MoWSS is the Department of Water Supply and Sewerage which is an 45 years old dedicated department, established in 1972, for drinking water supply and sanitation facilities.The Department provides and ensures safe, convenient and adequate water supply with sanitation as an integral component, and reduces incidence of water-borne diseases. It is rich in technical human resources, with over 1,850 permanent staff, and coordinates broad-network of regional and district offices in all 75 Districts, including 18 municipalities in three districts of Kathmandu Valley.

The Ministry of Urban Development is made responsible to formulate, implement, monitor, regulate and evaluate policy, plan and programme related to urban development, urban infrastructure, including physical planning, coordination, monitoring and evaluation of municipalities that contributes to attain SDG 11 (GoN, 2015).

The Ministry is also made responsible for settlement and housing development, management of haphazard settlement including housing for homeless urban poor. The KVDA contacts the Government through MoUD. The Department of Urban Development and Building Construction (DoUDBC) is implementing water supply, sewerage and drainage infrastructures as key project components in some urban development and environmental improvement projects. The projects have contributed to create awareness, develop minimum facilities and identify additional issues to improve water and sanitation facilities in project-targeted urban areas.

The Ministry of Federal Affairs and Local Development is responsible for local governance and plays a role in planning and implementing WASH projects with population below 1,000. The Ministry of Population and Environment is mandated to formulate and implement policies, plans and programmes related to environment, climate change, and pollution control and the Department of Environment could provide technical services in addressing pollution issues in Kathmandu Valley.

The Ministry of Health is mandated to formulate, implement, monitor and evaluate policy, plan and programme related to health, including extension of public health services and quality control. The Ministry promotes health and hygiene through water quality surveillance and emergency response measures. The Department of Health Services delivers preventive, promotive and curative health services and provides necessary technical advice in formulating health-related policies, and in implementing public health services, including problems arising from natural disasters and epidemics.

Organizations for the Valley

In addition to ministries and departments, four dedicated institutions are established only for Kathmandu Valley to implement water and sanitation related programmes and activities. They are KVDA, KVWSMB, KUKL and HPCIDBC.The Kathmandu Development Authority Act (1988), enforced in 2012, shall function on landuse planning and development, and construction works. The Authority has the power to:

a. Impose by public notice a ban on any type of physical change in any property within the area prescribed for a period not exceeding three years;
b. Stop any action taken without prior approval or in violation of the given terms and conditions;
c. Undertake land development programmes for planned and organized urban development; and
d. Mobilize financial resources, upon approval of the Government in order to meet necessary expenses.

The KVDA Act includes a provision to constitute a Physical Development Committee and a Management Committee. The former Committee is chaired by the Minister for Urban Development and functions as a decision-making, policy-making body, including the evaluation of progress achieved in implementing the plan. The Management Committee, chaired by the Development Commissioner of KVDA, is responsible for the direction, supervision and management of operations of the KVDA. The KVDA has focused on infrastructure improvement, environmental improvement, urban regeneration, and risk sensitive planning.

The Government has established corporations and development boards to deliver quality water supply and sanitation services[6]. As per the provision of the Water Supply Management Board (WSMB) Act (2006), the Government has established WSMB to improve water supply and sanitation system in urban areas (Metropolis, Sub-Metropolis and Municipalities). The WSMB aims at improving water services in large municipalities, improve technical and commercial efficiency in operations management, increasing productivity of employees and achieving institutional and financial sustainability in the long-term.

The Government has established the KVWSMB to provide regularly water supply and sewerage services to people of Kathmandu Valley by formulating necessary policies and rules on surface and groundwater sources. The Board regulates and monitors quality and norms of services, reviews and recommends on taxes, also reviews service provided by the service providers, formulates policy on groundwater sources, and issues permits to extract and use groundwater.

The Kathmandu Upatyaka Khanepani Limited (KUKL) was established in 2006 as a public company and operates under the Public-Private-Partnership (PPP) modality (http://kathmanduwater.org/). KUKL manages water supply and sanitation system, including wastewater services of the Kathmandu Valley previously operated by NWSC under a License and Lease Agreement with KVWSMB for 30 years.

The High Powered Committee for Integrated Development of Bagmati Civilization (HPCIDBC), established in May 2008, has the objectives of keeping the Bagmati River and its tributaries clean by preventing direct discharge of solid and liquid wastes to the river and to conserve the river system within the Valley. In order to achieve it, the Committee is mandated to construct: (i) trunk sewer pipeline along both the banks of river; (ii) secondary sewer pipelines; (iii) wastewater treatment plants; (iv) river training works; (v) roads and greenbelts along the river banks, and (vi) launch public awareness programmes. It has planned to construct sewerage line, implement river training works, and roads and greenbelts in about 30 km and operate 5 treatment plants. Riverbank protection works and riverside road construction aims to improve theBagmati River corridor by June 2017.

Municipalities

Article 214 of the Constitution of Nepal (2015) provides executive functions of the Municipality that includes the issuance of general directives, controlling and regulating the governance of the Municipality (NLC, 2015). The Municipal Executive shall approve its conduct of business. The Constitution has a provision of Local Consolidated Fund in each Municipality that contains all revenues and grants received, loans raised by Municipality and amounts received from other sources. According to the Constitution

[6]The Nepal Water Supply Corporation (NWSC), established under the Nepal Water Supply Corporation Act (1989) operates and maintains water supply systems in towns and villages outside Kathmandu Valley. The Rural Water Supply and Sanitation Fund Development Board, established through formation order, facilitates implementation of water supply and sanitation projects in rural areas.

(Schedule 8 and 9), the Municipality has the power to act on local taxes, manage local services, implement development plans and projects on basic health and sanitation, manage disasters and protect watersheds and wildlife. The concurrent powers of Federation, State and Local Level (also Municipality) are also on health, water supply services, service fee, charge, penalty and royalty from natural resources, water uses, environment, ecology and biodiversity, including disaster management.

In early 2017, the Government has elaborated Local Level powers. Municipality enjoys and exercises powers related to formulation and implementation of policy, law, standard, and plan on basic health and sanitation, improvement of safe drinking water, and control of air and noise pollution, awareness on sanitation and health-related waste management, fixing and regulating service fee and collection, reuse, treatment and disposal, and provide urban health services. The Constitution has provisions for mitigating environmental disasters; controlling pollution; and managing hazardous and other wastes. It includes provisions to formulate and implement drinking water policies, laws, standards and plans, including management of drinking water fees and services. In May 2017, the Government issued the Service Operation and Management Order to provide services till the Local Government Act is in place.

The Local Level is empowered to examine the design of field level sanitation systems (toilet, septic tank, soakpit) and discharge sites of faecal sludge in new and existing constructions. The Local Level is also empowered to supervise proper discharge of domestic and industrial sewage.

At implementation level, the Government has promoted establishment and involvement of Water Users Associations (WUAs). The WUA is an executive body. Water Users and Sanitation Committees develop, implement and maintain WASH services. 33% of the total members are women, and disadvantaged groups are represented in the Committee.

In addition to above organisations, NGOs and civil society organisations (CBOs) are engaged in providing water supply and sanitation services targeted to both the urban and rural poor. The NGOs and CBOs may help in collecting good practices, knowledge, and skills, and finding innovations for environmentally safe and hygienic sanitation facilities. The international and national NGOs are working together to provide better services, increase awareness and share information, resources and technologies to local people.

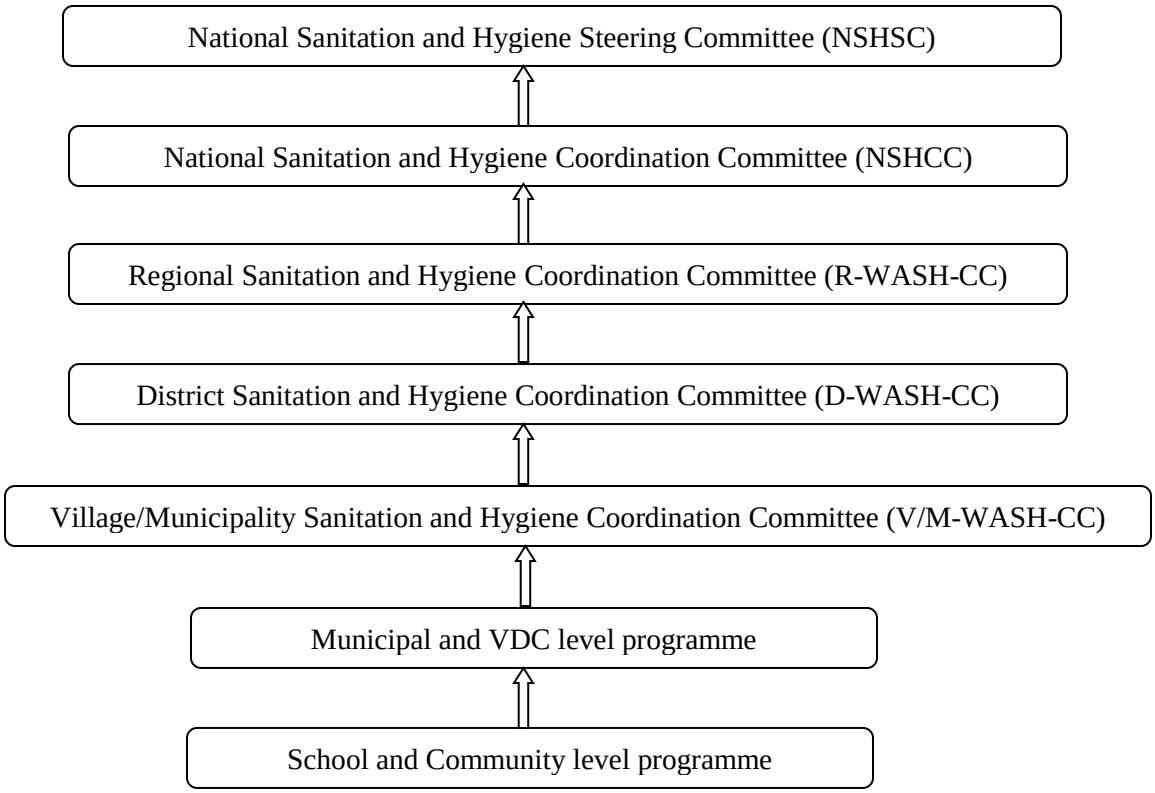
User"s federation, in particular FEDWASUN (Federation of Drinking Water and Sanitation Users Nepal) is facilitating drinking water, sanitation and hygiene services to communities, and is bringing local issues to the attention of policy-makers and service providers. The Municipality Association of Nepal (MuAN) is providing inputs for policy and programme development and implementation in municipalities, including Kathmandu Valley.

Shortage of drinking water has attracted the private sector in Kathmandu Valley for home delivery of water that is collected from streams or ponds or stone taps or even rainwater. People in Kathmandu Valley meet their increasing water demand from tanker services and street vendors. In July 2017, about 425 tankers have obtained licence to deliver potable safe drinking water. The tanker water is frequently checked for quality control by KVWSMB. The private sector is also engaged in providing services such as water bottling, jar water and solid waste collection. However, in the sanitation sector, private sector engagement is negligible.

A number of development agencies are supporting Nepal, including Kathmandu Valley, in expanding water and sanitation services. Most of the field level activities are implemented with the support of development partners, namely DFID, EU, FINNIDA, USAID, Government of India, PR of China, WB, ADB, UNDP, UNICEF, WHO, UN-Habitat etc.

Annex 3.4

Coordination and Linkage Mechanism on sanitation and hygiene[7]



Composition of Committees

1. National Sanitation and Hygiene Steering Committee

Chair: Secretary, Ministry of Water Supply and Sanitation (now dedicated Ministry)
Member-Secretary: Joint-Secretary, Water Supply and Sanitation Division
Members: Joint-Secretaries from NPC, MoF, MoFALD, MoH, MoEd, MoWCSW

Roles and responsibilities: Key responsibilities are to: (i) coordinate with NPC, MoF, relevant ministries, donors and I/NGOs for national level programmes and budget; (ii) review sectoral policies, plans, strategies and budget; (iii) give necessary direction, advice and guidance for the effectiveness of sector activities and implementation of sanitation and hygiene master plan; (iv) take leadership in dealing with pertinent national sanitation issues; (v) provide necessary guidance to NSHCC for sector effectiveness; (vi) approve and facilitate to endorse necessary sectoral documents; and (vii) conduct at least 2 meetings in a year.

2. National Sanitation and Hygiene Coordination Committee

Chair: Joint-Secretary, Water Supply and Sanitation Division, MoWSS (now)
Member-Secretary: Chief of Environment Sanitation and Disaster Management Section of DoWSS,

[7]Coordination and linkage mechanism as mentioned in Nepal"s Sanitation and Hygiene Master Plan, 2011.

Members: Joint-Secretaries from NPC, MoFALD, MoH, MoEd, MoWCSW, MoPE, DoWSS, DoLIDAR, DoEd, DoHS, DoWD, NHEICC, RWSSFDB, Social Welfare Council, FNCCI, concerned UN agencies, major WASH donors, Solid Waste Technical Centre, concerned I/NGOs, National Associations of DDC, Municipality and VDC and national federation/forum of water supply and sanitation and forest user groups etc.

3. **Regional Water Supply, Sanitation and Hygiene Coordination Committee**
   Chair: Regional Administrator
   Member-Secretary: Chief of Monitoring and Supervision Office of DoWSS
   Members: Regional offices of the government (Health, education and forests), FNCCI, concerned UN agencies, major regional level WASH donors, I/NGOs, development partners, National Associations of DDC, Municipality and VDC and national federation/forum of water supply and sanitation and forest user groups etc.

4. **District Water Supply, Sanitation and Hygiene Coordination Committee**
   Chair: DDC Chairperson
   Member-Secretary: Chief, Water Supply and Sanitation/SDO
   Members: Local Development Officer, DoLIDAR, DPHO, DEO, Women Development Office, Municipalities, concerned district donors, municipalities of the concerned district, NFCCI, association of public and private schools, concerned UN agencies, major WASH donors, I/NGOs, development partners, National Associations of DDC, Municipality and VDC and national federation/forum of water supply and sanitation and forest user groups etc.
   Advisor: Chief District Officer
   Note: In the absence of DDC chairperson, LDO will function as the chairperson..

5. **Municipality Level Water, Hygiene and Sanitation Coordination Committee**
   Chair: Mayor
   Member-Secretary: Executive Officer
   Members: Health facilities, NGOs, CBOs, FUGs, development partners, WASH users" committee, *Tole* Development Organisations, Child clubs, FCHVs, headmasters/principals, SMC/PTA, women groups, micro-credit organisations, local networks etc.

   Roles and responsibilities: Key responsibilities are to: (i) prepare and update WASH profile of the Municipality; (ii) analyse sanitation and hygiene issues and strategies to overcome existing barriers; (iii) prepare a short-term and long-term plan to launch sanitation and hygiene promotional activities along with budget, joint plan of action and responsibilities; (iv) form a monitoring team for regular monitoring and provide technical backstopping to the communities and schools; (v) organise review meetings and follow-up activities for smooth implementation and monitoring; (vi) endorse strategic plan/plan of action and budgets for total sanitation for approval from Municipality Council; (vii) coordinate with D-WASH-CC for sharing of necessary information and decisions; (viii) do resource mapping and stakeholders analysis for the effectiveness of programmes; (ix) organise meeting at every 3 months for planning, programming and appraisal of the performance of sector activities; and (x) launch innovative and creative activities as appropriate.

6. **VDC Level Water, Hygiene and Sanitation Coordination Committee**
   As VDC is now replaced by Rural Municipality, compositions and roles and responsibilities are similar to municipality level coordination committee.

Note: At each level of coordination committee, a task force comprising of 4-5 members (at least one female member) of the respective committee may be formed to assist overall planning and programming.
Name of ministries has been renamed as they are in August 2017

Annex 4.1

Fundamental Rights and Duties in the Constitution of Nepal

1. Right to live with dignity (Article 16)
2. Right to freedom (Article 17)
3. Right to equality (Article 18)
4. Right to communication (Article 19)
5. Right relating to justice (Article 20)
6. Right of victim of crime (Article 21)
7. Right against torture (Article 22)
8. Right against preventive detention (Article 23)
9. Right against untouchability and discrimination (Article 24)
10. Right relating to property (Article 25)
11. Right to freedom of religion (Article 26)
12. Right to information (Article 27)
13. Right to privacy (Article 28)
14. Right against exploitation (Article 29)
15. Right to clean environment (Article 30)
16. Right relating to education (Article 31)
17. Right to language and culture (Article 32)
18. Right to employment (Article 33)
19. Right to labour (Article 34)
20. *Right relating to health (Article 35)*
21. Right relating to food (Article 36)
22. Right to housing (Article 37)
23. Right of women (Article 38)
24. Right of the child (Article 39)
25. Right of *Dalit* (Article 40)
26. Right of senior citizen (Article 41)
27. Right to social justice (Article 42)
28. Right to social security (Article 43)
29. Right of the consumer (Article 44)
30. Right against exile (Article 45)
31. Right to constitutional remedies (Article 46)
32. Implementation of fundamental rights (Article 47)
33. Duties of citizen (Article 48)

Annex 5.1

Ministry of Urban Development
Department of Urban Development and Building Construction

(Pertaining to Chapter 7 of the Rainwater Harvesting Guidelines, 2009, # 9)

Composition of the Central Steering Committee and Municipal Level Committee on Rainwater Harvesting

Central Committee

1	Secretary, Ministry of Urban Development (former physical planning/construction)	Chair
2	Chief, Drinking Water/Physical Planning Divisions	Member
3	Chief, Municipality Management Division, Ministry of Federal Affairs and Local Development	Member
4	Director-General or Officer representative, Department of Water Supply and Sewerage	Member
5	Director-General or Officer representative, Department of Health Services	Member
6	Representative, Association of District Development Committee (ADDCN)	Member
7	Representative, Municipality Association of Nepal (MUAN)	Member
8	Representative, VDC Association of Nepal (NAVIN)	Member
9	Representative, NGO Forum	Member
10	Officer Representative, Institute of Engineering	Member
11	Representative, Community-based Organisation related to Drinking Water	Member
12	Expert Representative nominated by the Government of Nepal (2)	Members
13	Director-General, Department of Urban Development and Building Construction	Member-Secretary

Note: Officers representative from the World Health Organisation and UN-HABITAT may be invited in the meeting of the Central Steering Committee.

Municipal Level Committee

In case of municipal areas, a municipal level committee will be in place for necessary support and coordination. The composition of the Committee is as follows:

1	Chief of the Municipality	Chair
2	Executive Officer/Secretary of the Municipality	Member
3	Association/Committee/Board related to Drinking Water	Member
4	Chief, District Health Office	Member
5	Representative, NGOs working at the municipal level	Member
6	Concerned Officer representative of the Municipality	Member
7	Subject Specialist nominated by the Municipality	Member
8	Representative from Drinking Water Consumer Committees	Member
9	Department of Urban Development and Building Construction	Member
10	Chief, Divisional Office	Member-Secretary

Note: DoUDBC is responsible for supervision and coordination of the guidelines implementation.