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SECURING WATER IN THE RAPIDLY URBANISING GLOBAL SOUTH: INSIGHTS FROM CRITICAL ANALYSIS OF 'SECTORAL POLICIES' IN NEPAL

Gyanu Maskey[1], Chandra L. Pandey[2] and Krishna K. Shrestha[3]

ABSTRACT

Cities in the global south are facing complex challenges of climate change, unplanned development and ageing water infrastructure. Climate change is likely to undermine the ability of urban water supply systems to meet both the present and future needs of the population. Concerns have been raised about the existing water management policies inability to address the challenges of climate change and unplanned urban development. The paper investigates whether and how the sectoral policies on climate change, urban development and water address critical urban water issues and; how and in what ways these policies are linked (or not linked). Based on the analysis of urban, water and climate policies and drawing insights from water forum meetings organised in Dharan and Dhulikhel, we demonstrate that the existing urban, water and climate related policies have insufficient focus on urban water and lack effective interlinkages amongst these themes. Lack of awareness about the policy provisions, challenges and ambiguities in implementing the policy provisions, lack of recognition of the stakeholders' role in policy formulation and its effective implementation, unclear provisions made in the policies appear as constraints for implementing the policies. We argue that a coherent policy framework would help to address the complex issues of urban water, shaped by climate change and urban development.

Keywords: Water management, urban planning, climate change adaptation, policy analysis

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INTRODUCTION

The Global South is rapidly urbanising, so are the rising scarcity and issues of water accessibility for these cities. Cities are facing the complex challenges of climate change, population growth, ageing water infrastructure and degrading ecosystem, whilst needing to foster prosperity and economic growth (Dunn et al., 2017). While many countries in the Global North have started to integrate climate change concerns into water management strategies (Subak, 2000; Rosenzweig et al., 2007; Ruth et al., 2007; O'Hara and Georgakakos, 2008), Global South have compromised short-term needs (Ziervogel et al., 2010).

World Resource Institute (WRI)'s updated Aqueduct Water Risk Atlas finds that 17 countries, which are home to a quarter of the world's population, face "extremely high" water stress. Nepal is one of the fastest urbanising countries in South Asia. Nepal ranks 40th in the list of countries facing water stress in the world, and the fourth most water stressed in the South Asia region, behind India, Pakistan and Afghanistan (WRI, 2019).[4] It is considered the 14th most vulnerable country in the world in terms of the climate change vulnerability index (Eckstein et al., 2017)[5] and natural disasters, many of which are water-related (MoPE, 2016). It is anticipated that climate change will critically impact the hydrological system, water sources and water dependent human activities in the coming years (IWMI, 2012; NRC, 2012). Combined with the rapid land-use transformations taking place across many of the mountain landscapes of Nepal, climate change is poised to escalate water insecurity in many water-deficit regions of the country (Dahal et al., 2019).

Nepal has a raft of policies for water management, climate change and urban development. There are 18 Acts, 10 regulations and 3 treaties related to water with mandatory provisions. Similarly, water plan, policy documents, formation orders, strategies and guidelines, bilateral minutes, Memorandum of Understanding facilitate the mandatory activities (WECS, 2019). Nepal has made remarkable progress in terms of policy formulation; and strategies for responding to urbanisation are more or less in place (MoUD, 2016). Moreover, Nepal is also making great efforts to address climate change endorsing climate change policy and adaptation plans at national and local level, and strategy to move towards low carbon climate resilient development (MoPE, 2016; MoFE, 2018). Institutional arrangements and their strengthening, program development and implementation have also been prioritised.

However, the responses have not been enough to offset the challenges created by a dramatic shift in urban driven demands (MoUD, 2016). Despite having a series of water policy reforms in Nepal, and formulation of a raft of urban and climate change policies, the major challenge remains to be their effective and accountable implementation. The

[4] The World Resources Institute's updated Aqueduct Water Risk Atlas 2019

[5] Global Climate Risk Index 2018

effectiveness of implementation often links with the lack of interconnectedness of these policies. Yet, these issues are rarely assessed because of resource limitation, limited institutional capacity to design, deliver effective management functions and lack of accountability/political will. Lack of integrated urban governance in cities is brought about by uncoordinated sectoral policy mechanisms along with fragmented institutional arrangement and lack of technical expertise are major issues of concern (NUDS, 2017). Water issues are critical in urban areas with the specificities of urban areas as high population density, increased economy and built-up structures, surface sealing, land use changes, changing lifestyles of people, complex governance structures and policies. Studies show that existing water and urban development policies and frameworks are fragmented and ineffective to deal with the issues of climate change as they have failed to capture the changing climate to promote climate resilient sustainable cities (Pandey and Bajracharya, 2017; Biggs et al., 2013). On the one hand, climate change policies are being too encompassing, leaving water policies in the shade. These policies seem to be only emphasising the significance of water sector in terms of dealing with climate change. On the other hand, water related policies have not fully integrated climate change (Regmi and Shrestha, 2018). Sectoral policies formulated by the government have inadequate focus in mainstreaming the climate change adaptation issues (Nepal, 2019).

A centralised policy-design process, low awareness among the government officials, lack of development partner's interest, uncertainties about climate change financing, lack of priority of the nation and political commitment have made climate change policies debatable in the higher-level policy arena and has led to inadequate sectoral integration of climate change adaptation in their policy design (Pant and Gautam, 2013; Ojha et al., 2016; Nepal, 2019). Climate change policies have not been able to establish relationship with policy domains of water and urban planning, along with energy, agriculture, and forestry, though relevant (Corbera et al., 2019). Studies have found gaps in knowledge and understanding about the role of urban local government in adapting to the impacts of climate change on water (and vice versa) and the relation of climate change policies to development policies and process are considerably large (Jha and Shrestha, 2012; Corbera et al., 2019). It is not yet known if the policies related to water, urban development and climate change are tuned in a way that these policies work as complementary and not duplication or rival to one another. The question is essentially about the 'policy coherence' in urban, water and climate sectors wherein policy coherence is defined as the systematic promotion of mutually reinforcing policies across the government departments to create synergies towards achieving agreed objectives and to avoid or minimise negative spill-overs in other policy areas (OECD, 2016). There is no systematic mapping of key sectoral urban policies linked to water access and study on whether and how the sectoral policies on urban development, climate change and water are connected and how they address the issues of urban water. This gap has led to the review of existing policies in urban, water and climate sector which is an

opportunity for integration or addressing the issue of disintegration. The paper critically analyses the existing policies of Nepal, focusing on urban development, water resources and climate change to investigate: 1) whether and how the sectoral policies on climate change, urban development and water address critical urban water issues and; 2) how and in what ways these policies are linked (or not linked) and what insights can be obtained about policy cohesion for sustainable urbanisation.

The following section of paper will introduce the urban development, climate change and water. This will be followed by research methods. Furthermore, climate, urban and water policies and their focus on urban water and the interconnectedness of the policies will be discussed. Some constraints and opportunities in this regard will be discussed followed by the conclusion.

URBAN DEVELOPMENT, CLIMATE CHANGE AND WATER

The urban population of the world has grown rapidly since 1950, increasing from 751 million to 4.2 billion in 2018 with 55% of the world's population residing in urban areas in 2018 (UN, 2018). In 1950, 30% of the world's population was urban, and by 2050, 68% of the world's population is projected to be urban. In South Asia, urban population is poised to grow by almost 150 million by 2030 (WB, 2016).[6]

Mekonnen and Hoekstra (2016) estimate that four billion (two-thirds of global population) already face extreme water scarcity when seasonal and inter-annual variations in water availability are taken into account, implying that more than half the world's population may currently face water insecurity driven by resource scarcity (Jensen et al., 2018). World Health Organization (2018) predicts that by the year 2025, half of the world's population will be living in water-stressed areas. The highest water stress levels occur in Northern Africa and Western, Central and Southern Asia (UN Water, 2018). Urban areas of these rapidly urbanising developing countries are facing increasing water scarcity and at the same time, experiencing some of the world's most acute water related problems as flooding, access to potable water and sanitation and pollution of waterways (McFarlance, 2010). The problem is likely to aggravate further due to rapid changes in the hydro-environment, like climate change and land degradation (Vairavamoorthy et al., 2008).

Climate change is likely to increase water demand with reducing supply. The combination of climate variability and uncertainty regarding future changes is argued to make water resources planning very challenging (Bharati et al., 2014). Cities and climate change are closely related (Broto, 2013) and urban centres are vital part of the global response to climate change (UN-Habitat, 2011; World-Bank, 2010; Broto, 2013). Studies showed that almost 40% of the world's population live in river basins that experience severe water scarcity during at least one month of

[6] World Bank, 2016

the year (Hoekstra et al., 2012). The change in intensity and frequency of precipitation will affect stream-flows. Consequently, it will increase the intensity of floods and droughts, with substantial impacts on the water resources at local and regional levels (Barnett et al., 2005; Vicuna et al., 2011 cited in Rochdane et al., 2012).

While climate change brings both positive and negative impacts, scholars have highlighted critical negative impacts on the availability of water resources in municipal areas (Yang and Zhu, 2017). Climate change is likely to worsen current stress on water resources, and one of the challenges is to respond to the uncertainties associated with future climatic conditions and the water need of rapidly growing urban population.

Water is essentially a local issue affecting people's everyday life. Yet, the availability and quality issues have implications beyond the local scale because of the impacts of water on economic development, competitiveness and assets of the location. Adaptation of the water sector, particularly the urban water system, is therefore, important because current water management infrastructures and practices are likely to be inadequate in reducing the impacts of climate change on water resources (OECD, 2011; Pahl-Wostl, 2015; Hoekstra et al., 2018). Shifts in governance and policies are crucial to address these issues (Shrestha et al., 2014; Pandey and Bajracharya, 2017).

Moreover, urbanisation and urban development is shaped by key policies of the State in sectors such as transport, agriculture, tourism, and industry in addition to the policies pursued in the urban sector (NUDS, 2017). The need to support urban water systems with more comprehensive, integrated approaches is well documented in the literature (Brown et al., 2009). For decades, academic debates and international policy forums have repeatedly called for more integration between water and related sectors through various concepts and frameworks such as Integrated Water Resources Management (IWRM) (Rahaman and Varis, 2005), Sustainable Urban Water Management (SUWM) and Water Sensitive Urban Design (WSUD) (Ashley et al., 2013). While the need for policy integration for improved water management is widely acknowledged, it has not been implemented in practice (OECD, 2011). The policies and strategies to promote climate resilient water management practice are lacking in South Asia problematised by the distribution of power and responsibilities across various levels of governance (Biggs et al., 2013). Developing countries, in comparison to the developed countries lag far behind in integrating water policies with development and climate change policies. These challenges have direct implications for sustainable development of cities as poor urban water system makes cities unsustainable.

The gaps identified by OECD Multi-level Governance Framework (OECD, 2011) in water policy design and implementation are linked to, or exacerbated by, key features of the water sector. Of the seven gaps identified, policy gap due to sectoral silos and fragmentation is the first one[7] that is crucial to achieve urban

[7] Other gaps identified are administrative gap, objective gap, information gap, capacity gap, funding gap and accountability gap

water security for sustainable urban development. Promoting urban water resilience involves planning, policy and action to align urban sustainability and sustainable urban livelihoods with the enhancement of the capacities of water users and managers to perceive water relevant risks and effectively respond to them (Romero Lankao and Gnatz, 2016). There is utmost need to devise the strategic vision recognising water as a key factor of sustainable growth in cities and strengthening policy coherence for an integrated urban water management.

RESEARCH METHODS

The methodological approach we have adopted for this research is the analytical reviews of existing policies and secondary literature. Our focus is on the analysis of policies related to urban development, water and climate change, in addition to the analysis of relevant articles and reports. For data collection, we searched the main policy documents on water resource management, climate change and adaptation and urban development of Nepal through Google search engine and visited the websites of respective ministries and departments[8]. We reviewed the fundamental policies in the sectors of urban, water and climate. We also incorporated the policy related insights from 8 water forums organised in Dharan and Dhulikhel, 4 water forums in each city.[9] Water forums[10] are the discussion forums in which diverse water related stakeholders deliberate on water issues and challenges they confront in the city.

For data analysis, we used both textual and contextual dimensions of 'discourse analysis'. We interpreted information and put them together into coherent stories to construct meanings and relationships (Dryzek, 2005). We used a three-dimensional thematic analytical framework to construct meanings and relationship between the urban, water and climate policies (ibid). We employed an open coding[11] system in three themes, which include a) sustainable urban development; b) urban water management; and c) climate change adaptation to analyse the policies on water, climate and urban development (see Figure 1).

[8] Websites (National Planning Commission, Ministry of Urban Development, Department of Urban Development and Building Construction, Ministry of Energy, Water Resource and Irrigation, Ministry of population and environment and others)

[9] Dharan Water Forum I (22 Dec 2016), II (32 Mar 2017), III (15 S ep 2017), IV (13 Jan 2018)
Dhulikhel Water Forum I (23 Nov 2016), II (19 Jun 2017), III (15 Sep 2017), IV (8 Feb 2018)

[10] Water forums are participatory, collaborative, and collective interdisciplinary engagement between the researchers and local stakeholders for sharing and co-learning on water related issues.

[11] Open coding is an important technique for qualitative data analysis in which the researchers go through data line-by-line to investigate the key emerging themes, agree for coding compatibility between the researchers for consistency and start coding theme-based information for the analysis of the data.

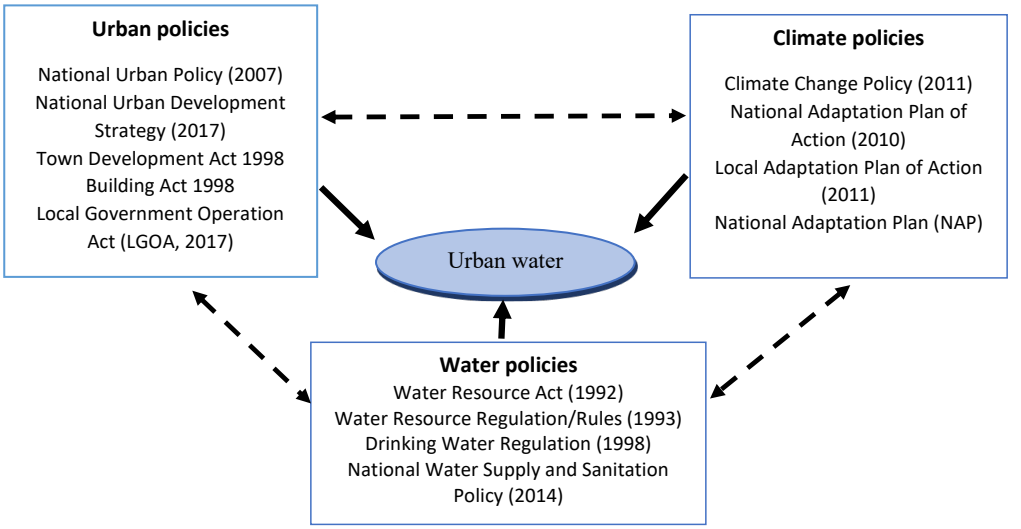

Figure. 1. Analytical framework showing the three sectors, the policies studied in each sector and the year of policy commencement.

URBAN, CLIMATE AND WATER POLICIES FOCUS ON URBAN WATER

In this section, we present our key findings of review of policies and examine how they are interlinked. We also discuss the context in which the urban development, water and climate legislations were formulated and whether or not the legislations address the urban water issues.

Urban development policies and 'urban water'

This section discusses the urban water issues in the urban legislations National Urban Development Strategy (NUDS, 2017), National Urban Policy (NUP, 2007), Local Government Operation Act (LGOA, 2017), Town Development Act (TDA, 1998) and Building Act (BA, 1998), as shown in the table below (Table 1). NUDS (2017) has been prepared in line with the NUP (2007), the Sustainable Development Goals (SDGs) and the New Urban Agenda, to address the critical issues and challenges of urbanisation and unleash the potential it holds in driving forward the national development. While NUP has provided guidance for urban development, NUDS[12] has shaped realising the need of strategic direction that will guide the urban development process. The LGOA (2017), which replaced Local Self Governance Act (LSGA, 1999), and in effect, now capturing the essence of the federal Constitution of Nepal 2015 stipulates the roles and responsibilities of urban and rural municipalities. While the TDA (1998) was

[12] It provides strategies for urban development for the next fifteen years by covering various sectors of urban areas such as infrastructure, environment, system, finance, economy, investment, land and governance.

formulated to provide necessary services and facilities to the residents of the town, Building Act (1998), formulated to regulate the building construction works in order to protect building against earthquake and other natural calamities.

Table 1: 'Urban Water' in urban legislations

Urban Regulations	Urban Water issues
National Urban Development Strategy (NUDS, 2017)	• Guiding principles – 'Green' to save, protect water body, protection and management of fresh water sources • Integration of rainwater harvesting within the building permit system, institutionalising water recharge provisions in public spaces, monitoring, strengthening system to produce and deliver safe water, • internalising regular monitoring system to assure water quality standard; promotion of community water storage facilities; facilitating private sector investment in water supply, and augmenting investment in waste-water treatment systems • Minimum water provisioning, water security, safety and sanitation coverage proposed
National Urban Policy (NUP, 2007)	• Empowers municipalities to plan and implement water supply-related activities • Provisions of subsidy in basic infrastructural services for encouraging private investment in drinking water and canals, conservation of natural resources as rivers and watershed and forest for sustainable use • Aims to contribute to water augmentation necessary for urban activities by implementing appropriate collection techniques for rainwater collection • Mentions 'drinking water and drainage' as pre-requisite for declaration of urban area as municipality
Local Government Operation Act (LGOA, 2017)	• Roles and responsibilities of urban and rural municipalities – about implementation and regulation of policies, laws, plans of local drinking water, drinking water management and tariff fixation at the local level • Has specific provisions of function allocation related to drinking water to the local level committees • Role of data management related to water source, ponds, well taps, stone spouts to the ward committee (clause 12) • Role provisioned to rural/municipality for conservation of assets including the water structures as ponds, canals, taps, wells within its jurisdiction (sub-clause 97).
Town Development Act (TDA, 1998)	• Acknowledges the urbanisation context in preamble • Empowers the Town Development Committee to formulate a town plan for protection of the forest and water areas
Building Act (BA, 1998 & 2007 Amendment)	• Provision to cut off the distribution of water supply with other amenities in case of not abiding by the building code

Climate change policies and 'urban water'

Key climate policies we discuss in this section are Climate Change Policy (CCP, 2011), National Adaptation Plan of Action (NAPA, 2010), Local Adaptation Plan of Action (LAPA, 2011) and National Adaptation Plan (NAP).

Nepal is a party to the United Nations Framework Convention on Climate Change (UNFCCC), Kyoto Protocol and the Paris Agreement, and is active in various UN and other regional organisations linked to climate change issue and has shown greater interest in formulating climate policies (MoE, 2012; Pandey, 2012; Dhungana et al., 2013, Helvetas & RRI, 2011). Since 2000, the government of Nepal implemented various policies and plans to systematically reduce climate impacts (Vij et al., 2017). From 1997 onwards, the policy framing was inclined towards protecting people from natural disasters. From 2003 onwards, Nepal framed strategies on how natural disasters increase vulnerability and risk for the poor. In 2009, climate change adaptation emerged as a new policy paradigm in Nepal. Policy documents such as NAPA (2010), CCP (2011), LAPA framework (2011) focus on the adaptation strategies to reduce the climate change impacts. Further, realising the inadequacy of NAPA, the UNFCCC came with the concept of NAP for a planned adaptation to take actions to address the impacts of anticipated climate in the future. Nepal has already initiated and is in the process of preparing NAP (MoPE, 2017), submitted Nationally Determined Contributions (NDCs) to the UNFCCC secretariat in 2016 (MoPE, 2016).[13] Sectorial policy instruments such as REDD Readiness Preparedness Plan (RPP), National REDD+ Strategy 2018 have been endorsed (MoFE, 2018). The table below highlights the 'urban water issues' in the climate legislations.

[13] Nepal Nationally Determined Contributions (NDCs). Submitted to the UNFCCC Secretariat in October 2016

Table 2: 'Urban Water' in climate legislations

Climate legislations	Water issues
Climate Change Policy (CCP, 2011)	• 'Water resource' identified as one of sectors highly vulnerable to climate change • Discusses climate adaptation, disaster risk reduction, water conservation technologies in ways as forecasting of water induced disasters and risks from climate change, early warning systems • Developing modern water conserving technologies as an alternative to flood irrigation systems • Identifying, developing and utilizing agricultural varieties/ species that can tolerate drought (too little water) and floods (too much water) • Development of drought/flood resistant agricultural varieties • Water conservation through source protection, rainwater harvesting & environmental sanitation under the heading of 'climate friendly natural resource management'.
National Adaptation Plan of Action (NAPA, 2010)	• 'Water resource & energy' and 'climate induced disaster' identified as thematic areas • In Water Resource and Energy theme, effects of climate change on water resources and implication of too much and too little water and its impact on hydropower discussed. • In Climate induced disasters theme, susceptibility to climate induced disasters as floods, landslides and droughts highlighted • Prioritised rainwater harvesting, ground water recharge and promotion, rehabilitation of traditional water sources, recycling & treatment of wastewater
Local Adaptation Plan of Action (LAPA, 2011)	• LAPA framework has identified water and sanitation as crucial along with watersheds and microfinance, education, local infrastructure, disasters and other environment-related issues • LAPA steps recognised vulnerability of women from water scarcity
National Adaptation Plan (NAP)	• Thematic group addressing water issues: 'water resource & energy' and 'climate induced disasters' • In Water resource and energy theme, inadequacy of planning & policy instruments for strengthening community capacity to deal with changing scenarios and climate change induced disasters highlighted • In climate induced disasters, it has been pointed out that the current level of efforts in integrating climate change into disaster risk reduction policies & plans is slow

Water policies and urban water issues

Key water legislations we discuss in this section are Water Resource Act (WRA, 1992), Water Resource Regulation (WRR, 1993) for drinking water purposes and Drinking Water Rules (DWR, 1998). WRA (1992) is an umbrella act governing not only drinking water but also other uses of water and overall water management in Nepal.

The provisions made in the water legislations are discussed in the table (see table 3) which signifies that WRA (1992) has prioritised 'Drinking water and domestic users' while utilising water resources and discusses the formation of Water Users Association. The WRR (1993) provides procedural mechanisms for the implementation of the WRA (1992) and covers the formation of Water User Associations and District Water Resource Committees. The DWR (1998) regulates the use of drinking water, registration and licensing of Drinking Water User Associations. National Water Supply and Sanitation Policy (2014) has the objectives of upgrading the existing basic water supply and sanitation services to medium and high level of services both in rural and urban areas by the year 2027.

Table 3: ''Urban Water' in water legislations

Water legislations	Urban water
Water Resource Act (WRA, 1992) • Prioritised 'Drinking water and domestic users' under priority one • Persons willing to make use of water resources for collective benefits on an institutional basis may form a Water Users Association as prescribed. • Mentions Government of Nepal (GoN) shall pay compensation to the concerned person for the land, building, equipment or structures relating to the utilisation of the water resources.	Not addressed
Water Resource Regulation/ Rules (WRR, 1993) • Formation of Water User Associations and District Water Resource Committees, licensing • Provides a dispute settlement mechanism in relation to water use service charges • Sets out the process to be followed by the State in relation to land acquisition and compensation	Not addressed
Drinking Water Regulation (DWR, 1998) • Regulates the use of drinking water, registration and licensing of Drinking Water of Drinking Water User Associations, control of water pollution • maintenance of quality standards for drinking water and provisions for the acquisition of house and land and compensation.	Not addressed
National Water Supply and Sanitation Policy (NWSSP, 2014) • Considers water supply and sanitation to both urban and rural areas • Sets the objective of drinking water source protection and conservation of the catchment areas of urban and rural water supply sources & creating appropriate environment for the private sector to participate in the urban water supply delivery.	Yes (urban and rural areas)

ANALYSIS AND DISCUSSION

We found that the sectoral policies on urban, water and climate have inadequately focused on urban water and these policies are not effectively interlinked, but fragmented. There have been few attempts, in fact, a few legislations have discussed the interconnected themes of urban-water-climate issues, but they do not effectively link all policies to address urban water issues.

Review analysis showed that few policies are aligned to consider the interlinkages amongst urban, water and climate themes which include NUDS (2017) and LGOA (2017) from urban legislation, and NAPA (2010) and NAP from climate legislations. Although NUP (2007) and NWSSP (2014) relates to urban-water linkages; TDA (1998) urban-climate linkages and CCP (2011), LAPA (2010) climate-urban linkages, these plans fail to connect the urban-water-climate nexus. The legislations BA (1998), WRA (1992), WRR (1993), DWR (1998) are standalone legislations (See figure 2). Regmi and Shrestha (2018) also highlight that the current water related policies in Nepal are almost ineffective to deal with the issues of climate change as the policies have failed to capture the changing climate context.

We also found that the recent policies, particularly developed after 2015 under the federal structure are considered progressive regarding sectoral interlinkages, specifically NUDS (2017), LGOA (2017) and NAP formulation. NAPA (2010) has prioritised several activities as rainwater harvesting, groundwater recharge, rehabilitation of traditional water sources, and waste-water treatment (MoE, 2010), and identified urban sector as a separate theme. However, it lacks detailed analysis of the options proposed to meet the need of safe and adequate drinking water considering the impacts of climate change (Jha and Shrestha, 2013). More recently, the Government of Nepal has revised the Climate Change Policy (2011) and circulated the preliminary draft of Climate Change Policy (2019) in mid-March 2019 (Uprety, 2019). The legislations formulated earlier than 2009 in Nepal deal with disasters and not climate change as the climate change adaptation emerged as a new policy paradigm in Nepal during 2009.

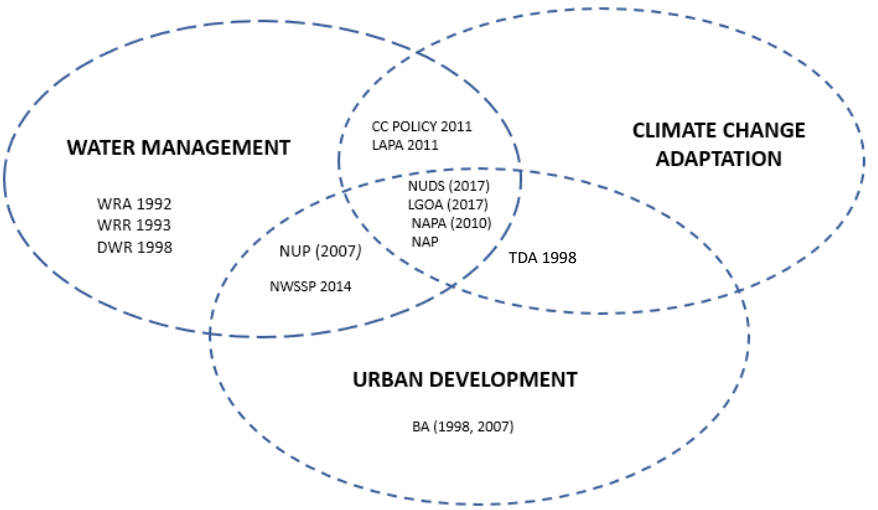

Figure 2. urban, water and climate policies interlinkages

Climate legislation

The analysis of the major climate legislations revealed that mostly water issues have been addressed at national levels while the urban water contexts are considered by only few legislations. NAPA (2010) and NAP have separate theme for addressing the urban and water issues. While CCP (2011) and LAPA (2011) have tried to address the water issue but left the urban one, NAPA and NAP have touched upon urban water issues through identification of urban sector as a separate theme. Adaptation Plans NAPs aims to reduce vulnerability to the impacts of climate change by building adaptive capacity and resilience; and integrate climate change adaptation into existing policies/plans and programmes within all relevant sectors and at different levels (GoN/MoPE, 2017).

In CCP, NAPA and NAP, the issues of water scarcity and impacts due to excess water have been closely linked to climate change. Water has been considered a vulnerable sector to the impacts of climate change and adaptation strategies to deal with water scarcity is also discussed. While LAPA includes water as the entry point, and is designed for the local adaptation, the urban water issues have not been highlighted. In the context of Kathmandu Valley, Jha and Shrestha (2013) highlighted that the CCP (2011) is not explicit on dealing with the water scarcity to meet the increasing water demand and decreasing water supply. However, the revised Climate Change Policy (2019) has expanded the thematic areas addressing the water issue specifically through 'forest, biodiversity and watersheds', 'water resources and energy', 'health, drinking water and sanitation' and 'disaster risk reduction and management'[14].

[14] emphasising the use of water efficient technologies, groundwater recharge, rainwater harvesting and storage, water source conservation and development of Payment for Ecosystem Services (PES) from adaptation programs based on ecosystem

The policy has additional theme 'rural and urban settlements' proposing strategy to implement adaptation programs to minimise the climate change impacts in unmanaged urban and rural settlements. Yet, the revised policy also does not clearly show the relationship between climate change impacts on water resources and management and the context of rapidly urbanising pattern and is silent on how to cope up with the rising demands of urban areas in the era of climate change.

Urban legislations

The focus of urban development policies is sectoral and take a conventional top down development approach. The urban policies excluding NUDS (2017) and LGOA (2017) have not considered the uncertainties of water unavailability due to global changes and what needs to be done to avoid such uncertainties for continuous water supply. NUDS (2017) integrates water in two of its underlying principles and presenting urban focused strategies on management and conservation of water as rainwater harvesting and water recharge. LGOA (2017) covers a range of provisions pertaining to drinking water management at the local level and specific provisions of function allocation related to drinking water to the local level committees. While TDA (1998) empowers Town Development Committee to formulate town plan with role of protecting the forest and water areas, recognising the urbanisation and population growth, BA (1998) simply mentions that the water supply will be cut off if the building code is not followed. It does not deal with urban water issues. As NUP (2007) and NUDS (2017) are urban specific legislations, they have focused on urban water issues.

Climate change issues are not specifically recognised in the BA (1998) and there are no clear components on climate change issues in the TDA (1998). DUDBC & MoSTE (2014) suggests that in future BA amendments, climate change can be specifically incorporated as a threat to the resilience of buildings (DUDBC & MoSTE, 2014). Although the Town Development Committees are provided with authority to establish green zones and protect natural ecosystems in and around urban areas, it will be highly optimistic to expect that town development committees or local bodies will exercise these powers to control town development activities (urbanisation process) or groundwater extraction (DUDBC & MoSTE, 2014).

Although NUP (2007) focuses on urban centered activities with drinking water as central focus by proposing water supply-related activities, it is silent on climate change (MoPE, 2017). It considers that it should have addressed the issue of climate change more robustly as the policy was prepared more than a decade after the ratification of the UNFCCC in 1994. DUDBC and MoSTE (2014) suggested future revision of the NUP should specifically take into account the climate change threats and refer to key climate change adaptation tools such as hazards mapping, land use zoning, and safeguards by-laws for each type of land use zones (DUDBC & MoSTE, 2014).

Water legislations

The review analysis of water legislations found that DWR (1998), WRA (1992) and WRR (1993) have not developed urban focus explicitly while addressing the overall water issues and have not taken urban issues into consideration. While the National Water Supply and Sanitation Policy (2014) considers water supply and sanitation to both urban and rural areas, it has not been able to incorporate the climate issues explicitly and according to WHO (2015), the policy have not covered aspects of potential impacts of climate change factors and necessary adaptation measures for sustainability of the services.

The DWR (1998) does not take into consideration the potential scarcity of water under the aegis of climate change. The WRR (1993) also does not mention about climate change impact to water resources and urban water issues. Water supply rules have not taken stock of the risk of potential climate change and course of actions to be taken (WHO, 2015). WRA does not consider the current and potential future negative impacts of climate change on water resources (HELVETAS, 2011) and has no mention of any management of technical practices for minimising the vulnerability. It has only mentioned that GoN may frame rules on matters in relation to water conservation and flood and soil erosion control. WRA has not addressed the sustainable urban development issues. It has only mentioned that the GoN shall pay compensation as prescribed, to the concerned person for the land, building, equipment or structures relating to the utilisation of the water resources. The Federal government is preparing a bill on "Drinking Water and Sanitation", to come into effect from 2019 challenging the jurisdictions of provincial and local governments.[15] The bill is not clear whether it is prioritising the demand management of drinking water or overall water resources management. It remains incomplete as it mostly focuses on privatisation of water and does not clearly state how the demand management will be achieved including the concerns of inequitable distribution and connection of drinking water to sanitation issues in addition to whether drinking water refers to all types of domestic and household use. The bill also overlooks the emerging threats of climate change and rising demand along with rapid urban population and growth on water resources. The climate water nexus has also been undermined in the bill.

[15] The constitutions of 2015 clearly states that local and provincial governments are entirely responsible for 'Water Supply and Sanitation' issues and this role is also kept in the concurrent power of the provincial and federal governments, however, the bill on 'Drinking Water and Sanitation' is being drafted without consulting the local and provincial governments implicating and challenging the power and authorities of sub-national governments.

CONSTRAINTS AND OPPORTUNITIES

While water, climate and urban policies are in silos and fragmented on the one hand, the existing policies have often been found poorly implemented on the other hand. One of the reasons behind this is the lack of awareness about the policy provisions. For example, NUP (2007) proposes discount or subsidy for private investment in drinking water, canals and encourages implementation of appropriate techniques for rainwater collection, these are not implemented effectively. Dharan sub-metropolitan city-initiated tax abatement provision in which 50% discount in building permit fees is provided to houses adopting any of the three components (sustainable water, maintain greenery, passive solar design) of Green Home Policy[16]. However, only 20 houses have taken this service and most of the adopted component is the sustainable building materials (blocks), and not much for recharge, which is due to limited message flow (Dharan Water Forum IV, 2018).

Next is that the legislations that make good provisions in addressing the issues face challenges and ambiguities in implementing t hem. For instance, some legislations a s N UDS (2017) i s good with proper provisions in the document but are not mandatory to implement as it is only a strategy. Although the Constitution of Nepal 2015 has listed watershed, rivers and water resources under the jurisdiction of federal, provincial and local levels (GoN, 2015) and LGOA (2017) has allocated roles and responsibilities related to water management and conservation to the municipalities and rural municipalities, the delineation of power and jurisdiction still remains unclear and the effective execution of these responsibilities remain challenging. The potential for overlapping and unclear authorities in any system where authority is not concentrated in a single tier of government is also noted by Kyle and Resnick (2016). Pandey and Bajracharya (2017) discuss that conflicting and competing policies, fragmented institutional setup, multiple actors working according to project driven modalities with absence of harmonisation efforts have led to duplication of roles and overlapping responsibilities at both the national and local levels policies.

The salient role of stakeholders' in policy formulation and in its effective implementation have not been often emphasised. Its importance is reflected by the insights of water forum organised in Dharan and Dhulikhel. The stakeholders' participation and discussion in a common platform 'water forums' organised in both cities, along with evidence-based research findings was observed to co-produce knowledge and influence policies contributing to water security in cities. The regular discussion platform, for instance, Dharan Water Forum III and IV organised by the municipality, offered a platform in identifying recharge pit as one of the viable options for ground water recharge

[16] Green Home Policy is implemented for promoting sustainable housing (2013-2015) by UN-Habitat and partners primarily in three cities of Nepal: Lalitpur, Pokhara and Dharan with wider impact to other municipalities.

owing to the high infiltration capacity of the soil.[17]. Based on this, the municipality adopted a policy of making groundwater recharge pit mandatory for new private and public houses. Regarding the role of stakeholders in effective implementation of policies, participants of the Dharan water forum IV suggested that executive body and municipal body can play a crucial role in implementation of the policy while the contractors/consultants' influential role in convincing the household head in implementing should not be ignored. The participants of Dhulikhel water forum IV also emphasised on properly crafted policy, plans and motivation with collaboration and coordination with relevant stakeholders to achieve vision of 'water self-sufficient Dhulikhel city'. Representative from Dharan Municipality presenting in Dhulikhel Water Forum IV shared some policies and international practices that could be well adopted as density bonus, tax credit, soft loan, speedy building permit process, defining sealing percentage, green rating system and tax abatement.

Besides, some provisions made in these policies are unclear fuelling confusion in implementation. NUP (2007) sets the provision of 'drinking water and drainage' as the criteria for declaration of municipality but there is no clarity regarding the volume of drinking water to be provided. We observed that most of municipalities declared in Nepal are struggling to meet sustainable urban water management. The case in point is that newly declared municipalities enjoy their municipal status without meeting the criteria related to drinking water facilities and sewerage management system, as in Bhaktapur.[18] The existing municipalities suffer from infrastructure deficit and many of them are not even in a position to be named as municipalities, lacking safe drinking water and sewage among others (Khatiwada, 2015).

Pandey et al. (2019) discuss that various conflicting water related policies including WRA (1992), WRR (1993), DWR (1998) and NWSSP (2014) have led to competing, conflicting and overlapping roles between and among urban water management institutions like Water users Associations, Water Supply Management Boards and municipalities in cities Dharan and Dhulikhel of Nepal. The policy formulation and institutional setup alone does not give much expected output unless complemented by legislations. Devkota (2018) noted lack of policy in Nepal to guide water management and governance at full scale and multiple water related legislations consisting of overlapping, contradictory and uncoordinated provisions to manage water. Further, instances are highlighted where policies to restrict commercial groundwater exploitation and stimulate sustainable use in line with national climate change policies, are not systematically enforced in peri -urban Kathmandu (Roth et al., 2018).

[17] the water forum endorsed promotion of technology with dual function of recharging groundwater and reducing volume of storm water, contributing towards solving the problem of too much and too little water

[18] My Republica, 2016 https://myrepublica.nagariknetwork.com/news/vdcs-turned-into-municipalities-without-meeting-basic-criteria/

Despite of various steps by GoN to respond to drinking water issue, climate change and natural disasters, constantly shifting government regimes have led to disruptions in policy making and implementation processes and undermined attempts to attain positive environmental outcomes. The challenge of water governance is further multiplied in the new Federal Nepal. However, the window of opportunity lies with the authority provided to the local government for developing required act and policies. The constitution of Nepal (2015) has provided the scheme of distribution of power among the centre, state and local levels. Climate Change Policy (2019) also promises to establish institutional frameworks for policy and functional coordination at national, provincial and local levels.[19]

Studies have suggested the integration of climate change in the existing sectoral plan and policies to address the issues of vulnerability and risk in the sectors (Agrawala, 2004; Srinivasan and Uchida, 2008). Regmi et al. (2018) offer a new perspective that the institutional structure needs to be reformed in order to provide opportunities for better integration and mainstreaming of climate change because policy has already reached to a turning point, specifically in the water resource sector. Nepal (2019) draws attention to the inadequacy of proper database with outdated and irrelevant data, lack of separate units of database in each sectoral ministry or department which remain the major constraints of most of the policies in and programs in Nepal. To build water security and equity in water access, water related policy efforts need to widen its avenues beyond the piped water grid (Molden et al., 2018) and take into consideration the uncertainties related to impacts associated with urbanisation and climate change.

CONCLUSION

The paper investigated whether and how the sectoral policies on climate change, urban development and water have addressed critical urban water issues and; how and in what ways these policies are linked or delinked. Using the analytical reviews of urban, water and climate policies and insights from eight water forum meetings organised in Dharan and Dhulikhel, the paper concludes that the sectoral policies on urban, water and climate have insufficient focus on urban water and these policies lack effective interlinkages. Despite having many urban, water and climate related policies in Nepal, lack of interlinkages among these policies pose challenge to sustainable management of urban water.

Review analysis also found that the recent policies, particularly developed after 2015 under the federal structure are found to be progressive regarding sectoral interlinkages. However, lack of awareness about the policy provisions,

[19] The policy commits to establish a council on climate change for policy coordination at the national level, climate change coordination committee for policy and functional coordination at the provincial level and climate change section or unit at relevant ministries at federal and provincial and local levels.

challenges and ambiguity in implementing the policy provisions, lack of recognition of the stakeholder's role in policy formulation and its effective implementation, unclear provisions made in the policies pose constraints to implementing the policies, among others. Although the delineation of power and jurisdiction remains unclear in new Federal Nepal, the window of opportunities lie within the authority provided to the local governments for formulating required act and policies but these authorities seem to be constrained by the federal government's silo attempts of introducing new policies without consulting the provincial and local government.

The paper shed light upon the interlinkages in policy framework of urban, water and climate themes. Despite of significant policy reforms, the ground scenario is not encouraging i.e. practice faces constraints. The gap between the policy provisions and practice need to be reduced with better monitoring of policy implementation on ground. The review suggests further research to relate the policies in silos for implementation by critically analysing the gaps identified for best practice and integrated policies.

Inadequate integration of urban-water-climate themes in the policies under this study suggest that new policies in these areas need to be connected for efficient, adaptive and equitable water management in cities in the context of climate change and unplanned rapid urbanisation. Therefore, an integrated and coherent policy framework is needed to address the complex issues of urban water, shaped by climate change, and urban development uncertainties. Integration of urban water issues in the climate legislations is very important as water is one of the most vulnerable sectors affected by climate change impacts. Similarly, urban development policies need to envision the uncertainties caused due to climate change on water resources and address effectively through the policies.

Coherent policy framework would help to address the complex issues of urban water, shaped by climate change and urban development. Policy frameworks in water need to encompass the climate change impacts, associated uncertainties and the necessary adaptation measures considering urban issues and efforts towards unified and transparent water resources policy (Biggs et al., 2013). The strategic policies and the institutional mechanisms need to be developed with the capacity of dealing with stress as climate change in more efficient and effective way (Regmi et al., 2018). For addressing water-related issues effectively, proper coordination to develop policies and institutional mechanisms at the local, state and national levels are desired (Bajracharya et al., 2019). Moreover, key policies and institutions at the federal level need to be revised substantively and timely in a way that competent, conflicting and overlapping roles of policies and institutions are reconciled. Further, integrated water resources policy that considers key characteristics of the integrated water resource management (IWRM), sustainable water resource management (SWRM), and adaptive management (AM) approaches need to be developed (Pandey et al., 2019).

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