Outlook on Climate Governance and Water Policy in India with a focus on Participatory Approaches

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About the organizations

The Hanns-Seidel-Stiftung (HSS), founded in 1967, is a German political foundation, implementing political and developmental cooperation "in the service of democracy, peace and development". The Foundation is working for more than 40 years in the field of development cooperation and is currently undertaking 80 projects in more than 55 countries worldwide. For over 20 years, HSS has been active in India. It strengthens human capacities and institutions, taking into account the social, political, cultural and economic conditions. The current focus is on supporting India's federal-democratic structures, strengthening its urban safety procedures, and facilitating solutions for local and regional water/environmental issues. A special focus is given to women empowerment. The foundation works with Indian organisations with similar objectives. The partners' independency and ownership are of particular importance to HSS.

CEE is an internationally acclaimed institution in the field of Environment and Climate Change Education as well as Education for Sustainable Development (ESD). It has considerable experience and expertise in addressing its primary mandate of improving public awareness and understanding of the environment with a view to promoting the conservation and sustainable use of nature and natural resources. Over the past 36 years, CEE has developed innovative programmes, educational material, undertaken demonstration projects and built capacities in the field of environmental education and sustainable development. Recognizing the complexity and vastness of work in the field of ESD, CEE works in partnership with a range of organizations at the national, regional and international level. The strategy is to collaborate with others to build synergies, achieve a multiplier effect, enhance effectiveness and widen the range of programmes.

Contents

Executive Summary

Water is an essential resource for economic, social and environment development. The climate change impacts have resulted in serious consequences on availability of water in India and the increasing demand are expected to pose further challenges. Water and climate change related policies as well as institutional mechanisms thus need to be coherent to address climate change induced effects and facilitate equitable access to water, while also improving water-use efficiency.

Participatory approaches, in the policy development process, are one of the core principles of good governance and have the ability to ensure coherence in cross-sectoral decision-making as well as implementation, thereby leading to sustainable solutions. The approach if strengthened across levels could prove vital for sustainable management of water resources.

This study conducted by Centre for Environment Education (CEE) with financial support from Hanns-Seidel-Stiftung India (HSS India), draws opinions from secondary literature, in-depth policy analysis and organization's experiences over the years. The study is mainly intended for discussions to strengthen coherence between existing policies and potential actions, through promoting stakeholder engagement within water policy and climate change governance.

Water is essential for all forms of life and any kind of social and economic development. Permanent water security supports poverty reduction and economic growth, while contributing to improvements in social well-being and inclusive growth, affecting the lives and livelihoods of millions. However, the increasing water stress and growing global demand for water has forced tough decision-making about allocation of water resources with a dire need to tackle the developmental challenges. Additionally, in the case of water, the consequences of climate change become most immediately a harsh reality, especially through impacts like water shortages during droughts and through flooding as a result of heavy rainfall or river flooding.

Due to this interconnectedness of development with water and climate change, the three global commitments adopted in 2015 - The Sustainable Development Goals, Paris Agreement and Sendai Framework - though discrete in nature with their own sets of targets, mechanisms and reporting requirements, have an overlapping agenda (UN Water,2019). Water forms a connector among these agreements and plays a major role in strengthening countries' climate change commitments for reducing disaster risks, ending poverty and inequality, fostering gender equality and social inclusion, and supporting the creation and maintenance of jobs across all sectors of the economy.

Fig 1. Role of water as a connector among the global commitments adopted in 2015 *(Source: UN Water)*

India faces large scale climate variability and is exposed to enhanced climate change risks. The country can expect severe impacts on the lives and livelihood of its people. These impacts have the potential to create multiple stresses considering the country's development challenges. With its large population dependent on agriculture, the country is exposed to high levels of climate risks. The Global Climate Risk Index 2019 (Eckstein et al., 2019) based on data from 2017 places India as the fifth most affected country

on account of climate change. Addressing these development needs, India seeks to utilize the opportunities that lie in tackling the environmental and socio-economic challenges jointly in a sustainable development pathway.

According to India's Nationally Determined Contribution (NDC) to United Nations Framework Convention on Climate Change (UNFCCC), climate change is likely to adversely affect the water balance in different parts of India. Water is indispensable in agriculture and food production as well as in many industrial processes, the NDC's adaptation strategies for the water sector focus on enhancing efficient use of water, ensuring access and tackling of the adverse impact of climate change.

The United Nations defines water security as *"the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability "*.(UN Water, 2013) UN-Water also developed a conceptual framework (Fig below) outlining eight key aspects that form the larger nexus of water security with respect to good governance, drinking water and human well-being, transboundary cooperation, ecosystems, financing, water-related hazards and climate change, peace and political stability, and economic activities and development. The framework highlights a cyclical feedback loop reflecting inter-dependence among these aspects, with

Fig 2. United Nation (UN)-Water's conceptual framework *(Source: UN Water)*

Interconnectivity of elements that fall under the aegis of local and regional authorities within a country, and external government links vital to advance national plans in the field of water management (Soto-Rios et al., 2018).

India has just 4 % of the world's fresh water resources on which about 17% of the global population depends. With declining ground water level at the rate of 10 cm per year, contamination of over 70% of surface water and ground water resources and nearly 50% leakages in water supply, water scarce situation is observed throughout the country (S Kumar and Bharat, 2014) with 92 million people without access to safe drinking water (India's NDC, 2015). India requires appropriate governance mechanisms to address the changing water scenarios as well as mainstream climate adaptation into sectoral policies.

The National Water Policy (NWP) 2012 makes recommendations on several major issues including adapting to climate change, enhancing water availability, water demand management, efficient water use practices, water pricing, conservation and infrastructure, institutional arrangements etc. Considering the agricultural sector uses more than 90% of India's water (Development Alternatives,2015), the NWP emphasizes an urgent need to evolving the agricultural system, which can economize water use and maximize the value from water and also enhance water use efficiency through curbing wastages. The NWP also projects that the future needs of water will be met more from demand management and emphasizes the role of community participation in addressing the water crisis (National Water Policy,2012).

India acquires an intriguing dual position in the global climate politics as a developing economy with low levels of historical and per capita emissions, and as a large and rapidly growing economy with rising emissions. The country also carries an additional responsibility of meeting the development needs and economic progress of its vast population, to build climate resilience and reduce the vulnerabilities. As mentioned in India's Intended Nationally Determined Contribution (NDC) "*Given the development agenda in a democratic polity, the infrastructure deficit represented by different indicators, the pressures of urbanization and industrialization and the imperative of sustainable growth, India faces a formidable and complex challenge in working for economic progress towards a secure future for its citizens*" (India's NDC, 2015). A similar political and governance approach to climate change is being worked upon at the national, sub national and local levels.

Equitable, inclusive and sustainable use of water resources has to be the key to the new model of growth that India is committed to pursuing. The basic principles of environmental governance, including structured regulatory and institutional mechanisms, need to play an enabling role in promoting and fostering actions on climate change. A well-defined planning and execution process has to be the basis for devising immediate, medium and long-term climate change strategies that duly integrate the country's developmental imperatives in context to water and agriculture.

Water security complemented by food and energy security is the primary need of a climate-resilient society. Therefore, national, state as well as local climate policy and planning must take an integrated approach to climate change and water management. In this 'food-water-energy-land-climate nexus', an integrated water policy that would enable all people equally including the rural and urban poor to access clean water and affordable food, is an essential prerequisite.

Consequently, climate action should be mainstreamed in sectoral policies, and be reflected in their objectives, and in the plans and programmes that flow from these policies. The complex climate policy approach and larger vision of development needs to be *institutionally* interwoven into the further complex governance apparatus of India's federal structures that facilitates Integrated Water Resource

Management (IWRM). Such integration necessitates the evolution of new political mechanisms and institutions that can deal with the complexities of, and need for cross-cutting interwoven actions that address climate change issues as well as feed into the sustainable development agenda.

The central purpose of this study is therefore to shine a light on the water policy formulation process in line with the climate change governance framework of the country at various levels (national, state, local), representing and analyzing the policy efforts undertaken and institutional mechanisms developed for reducing water-related vulnerabilities, to strengthen resilience of communities and society. The study attempts to reflect on the current policy tools within the climate and water niche, through drawing inputs from the consultations. The study has a potential to make an important contribution to the existing climate agenda by capturing processes in the water-related discourse.

Majorly based on secondary literature available online, the study reflects on Centre for Environment Education's experiences over the years, particularly in the climate change and water domain. For this, a qualitative documentary and policy analysis was undertaken supported by inputs from external as well as in-house experts.

A key objective of this study is to understand the full breadth of climate governance across the water sector. In line with the same, the study discusses the water and climate policy development processes in India and illustrates the existing level of stakeholder engagement and possible ways to strengthen the same thereby improving the climate policy dialogues as well as actions at the local, regional and national level. While the study largely centers on participatory approaches within water policies and sheds light on demand and supply side management efforts, efficiency, irrigation practices, urban-rural conflicts, technology and finance; it does not address the water quality aspects of water

The water security challenges across large parts of India have driven water policy long before climate change policy came into effect. By now, water and climate change are tightly connected challenges, so their policy approaches need to be coherent as well. India's development policy-making is mostly driven by national ministries and allows for such coherence. The ministries provide guidelines and financial resources to state governments who are then expected to implement plans through their municipal bodies on both climate change and water, taking the interwoven character of the two challenges and the according policy into consideration.

2.1 Climate Governance

The national government is at the apex of India's multi-level governance framework in setting up the climate change agenda, formulating policies and thus guiding tailored implementation at the state level. The Ministry of Environment, Forest and Climate Change, Government of India, as the focal point for climate change, deals with all aspects of environment, and climate change in particular. Few state governments have proactively been formulating and implementing the climate policies in line with the national plans, guidelines and policies, based on their economic viability. National policy making, state level planning and decentralized, locally tailored implementation lies at the core of successful climate initiatives. The recent reforms have been vital in supporting both state and municipal governments to a considerable extent, which when complemented by appropriate financial mechanisms could prove effective in the long run.

Realizing the need to strike a balance between central top-down policies and subnational bottom-up approaches in order to address national environmental, social and economic concerns, climate change forms a shared responsibility of the state and the central governments, as per the Constitution of India.

India's key international climate change policy commitment is the Nationally Determined Contribution (NDC) prepared for the United Nations Conference of the Parties in 2015 that adopted the Paris Agreement. It sets India's climate action within the perspective of propagating a healthy and sustainable lifestyle based on traditions and values of conservation and moderation. Apart from the mitigation targets highlighted in the Box 1, India sets adaptation and resilience as a national priority. It highlights current initiatives in climate change sensitive sectors such as

Box 1. Major NDC targets include:

- Lowering emissions intensity of its GDP by 33-35% compared to 2005 levels by 2030;

- Increasing total cumulative electricity generation from fossil free energy sources to 40% by 2030;

- Creating additional carbon sink of 2.5 to 3 billion tons through additional forest and tree cover.

India's NDC targets identify water as the most critical component of life support system and include various adaptation strategies for the water sector such as enhancing efficient use of water, ensuring access and tackling the adverse impact of climate change. With new scientific information and technological advancement, India has also revisited the National Missions under the NAPCC and is redesigning the National Water Mission and National Mission on Sustainable Agriculture.

Source: India's NDC, 2015

rain-fed agriculture, water resources and health as well as the ecosystems of the Himalayan and coastal regions.

Core to the national policy is the National Action Plan on Climate Change (NAPCC) of 2008 with its eight missions undertaken by respective ministries. Four of these missions address mainly adaptation to climate change; three related to mitigation and one relates to knowledge. The NAPCC formed one of the most significant climate-related policy frameworks in India which was developed in 2008 and enabled the debate within other stakeholders including people, media, academia, civil society and private sector. Constructing a climate change plan at the highest political level, producing drafts, and deliberating on the issue helped identify measures that promote our development objectives while also yielding co-benefits for addressing climate change effectively.

Box 2. NAPCC defines prospective strategies and programmes to address climate mitigation and adaptation through eight National Missions:

- National Solar Mission
- National Mission for Enhanced Energy Efficiency
- National Mission on Sustainable Habitat
- National Water Mission
- National Mission for Sustaining the Himalayan Ecosystem
- National Mission for a "Green India"
- National Mission for Sustainable Agriculture
- National Mission on Strategic Knowledge for Climate Change

Source: NPACCC, 2008

The NAPCC was developed by the Advisory Council on Climate Change, and is headed by the Prime Minister who guides formulation of the country's approaches on climate change. The council includes representation from national ministries, industry, academia and civil society, however it lacks the representation of the state governments who are the implementing entities of these plans.

To translate and decentralize the NAPCC objectives, state action plans on climate change are made consistent with the strategy outlined in the NAPCC and are prepared to harmonize national and state level actions. As the first comprehensive climate strategy, NAPCC marks the initial step towards mainstreaming climate change as an individual as well as cross-cutting policy item.

The states and union territories were in 2009 asked to develop their individual State Action Plan on Climate Change (SAPCC) in line with the objectives of NAPCC and to address state specific issues while building on several existing energy, water, agriculture and development policies. SAPCCs are strongly influenced by the priorities of each state government with significant variations in synergies with climate policy. For example, Gujarat was the first and only State in India, the first in Asia and fourth in the world to set up its own climate change department in 2009 and since then has been mainly working on mitigation actions with ambitious plans for expanding renewable energy. Most of the Gujarat's SAPCC (developed in 2014) outlines concern policies to attract wind and solar energy investments to create economic opportunities by considering its geographical location and favorable investment environment. Similarly, Karnataka's SAPCC is in response to the pressing development needs rather than climate change concerns but link them closely to mitigation.

 SAPCCs have been developed by 32 states till date and reflect the priorities of tackling different aspects of climate change impacts and challenges in locally meaningful ways. Key sectors covered by SAPCCs

include agriculture, water, habitat, forestry, health and disaster management among others. Most of the SAPCCs focus on climate adaptation in the agriculture sector and enrich the central government's climate change policy by feeding local and regional experience, needs and solutions into the overall approach to climate change strategies at the national level.

As SAPCCs are closely aligned with the NAPCC, the state climate plans were also required to put forth targets outlined in the national missions, such as 20% increase in water use efficiency in the water mission. Mostly driven by local objectives, water conservation forms an integral part of the SAPCCs. While Sikkim SAPCC focused on water conservation with 80% of its rural population dependent on Himalayan springs for its water supply, Himachal Pradesh's SAPCC (HPSAPCC) prioritizes water resources as well as studying how efficiently they are used. Madhya Pradesh SAPCC mentions the reassessment of ground water resources (Dubash & Jogesh, 2015). The broad strategies listed in the water sector of the West Bengal, Karnataka, Sikkim and MP SAPCCs, indicate that several state recommendations closely correspond with objectives stated in the National Water Mission, with relatively little scope for creative reframing of the water-climate linkage (Jogesh & Dubash, 2015).

Stakeholder engagement especially in terms of cross-departmental deliberations, external inputs and consultations with business, civil society and public plays a key role in shaping sub-national policies and has the potential to garner innovative solutions in the form of new voices and ideas. The processes of drafting SAPCCs were relatively more participatory than other state-level planning exercises as it involved multiple departments, encouraged external participation, and facilitated expert consultations (Dubash & Jogesh, 2015) However, most of the SAPCC development processes have lacked public participation. For instance, a peer review group comprising of universities' Vice Chancellors as well as

scientists was set up under the HPSAPCC, to vet the draft plan. This led to the development of a new district level vulnerability assessment study using climate-based variables and emerged as one of the most significant interventions under the HPSAPCC. Stakeholder participation varied greatly across the SAPCCs (See table below).

Table 1. Process followed across various SAPCCs

State	Experts	Departmental participation	External participation
Himachal Pradesh	Peer review group assists the nodal agency.	Departmental inputs sought through workshops.	WWF organised a workshop bringing officials and external participants to talk about the SAPCC process, though the draft was not available to external participants to comment upon.
Karnataka	BCCI-K report provides scientific expertise to the state plan.	Departmental inputs sought through a questionnaire and some meetings.	No formal platform to garner external participation.
Madhya Pradesh	Experts provided feedback on sectoral chapters.	Departmental inputs sought through workshops.	13 regional workshops, 12 sectoral workshops in Bhopal.
Odisha	Sectoral experts assisted working groups.	Working groups draft sectoral chapters.	3 regional consultations, 2 workshops in Bhubaneswar, Plan put in public domain.
Sikkim	Consultants took on the role of experts.	Working groups draft sectoral chapters.	NGOs embedded in working groups. Plan put in public domain.

Source: Anu Jogesh & Navroz K. Dubash, 2015

The climate plans thus need a more robust framing with a structured process that enables broader dialogue within and outside government, highlighting sector specific outcomes and implementation priorities which could be possible through integration of sustainability and climate resilience into sectoral targets such as water security.

An analysis of these SAPCCs available on the website of the ministry, suggests that the plans have limitations at various levels and may not help the states become climate resilient. The common thread across these shortcomings is the way these plans are viewed as vehicles for generating implementable actions rather than an opportunity to redirect development towards climate resilience. However, state plans provide a foundation upon which climate concerns can be more effectively mainstreamed in local development planning. The financial resources for these strategies is centrally mobilized through Gross Budgetary support and also from the 13th Finance Commission which recommends grants to States for environment action, covering some of the activities under the NAPCC. International financial assistance could be mobilized through bilateral and multilateral channels to meet the gaps in resources/ funding.

Prioritizing adaptation by decision of the Prime Minister's Climate Council, India has set up a National Adaptation Fund on Climate Change (NAFCC) in 2015 (PIB, 2016) with a view to fill the funding gap of adaptation projects in India that international climate finance does not seal. The National Bank for Agriculture and Rural Development (NABARD) was appointed as the national implementing entity and is responsible for funding adaptation projects that are based on the needs and priorities identified in the SAPCC, the eight missions of NAPCC and the NDC. Most of the projects concern adaptation measures for water management and resilience building in the agriculture sector.

At the local level, the implications of the SAPCCs for local governments depend on the level of decentralized governance and differ substantially across states as well as climate-related policy areas. While education and health sector have a clear local governance structure, institutional mechanisms for climate change at the local level are too fragmented in order to drive climate action. The power mostly falls under realm of state governments, which then delegate responsibilities to local bodies for implementation. However, institutional and financial capacities at the local level remain weak and urban local bodies, local communities, as well as non-governmental actors struggle to find the resources to act on issues related to climate change. The cross-cutting nature of the climate policies further lead to difficulties in inter-departmental coordination at the local level and also at the state level. At the same time, knowledge on climate change and climate action is rising day by day. Still, support and coordination is much required.

Despite the general top-down nature of multi-level climate governance, there is also evidence of cities going beyond national or state requirements and incorporating climate change into urban development processes. Rajkot Municipal Corporation, Gujarat was successful in integrating climate specific objectives during the implementation of national and state level schemes on affordable housing as well as energy efficiency and renewable energy (GIZ, 2018).

Climate action plans and strategies at the local level with necessary financial and institutional empowerment, and policy support would be fruitful in mainstreaming climate change actions with several economic, social and environmental co-benefits. On the institutional angle, it would be important to further empower the local governments to develop climate actions with strong people participation and conducive policy frameworks. For India, it is vital to have people and local governments at the forefront for climate-specific actions as they need to be locally sound and sustainable, which only the local stakeholders can guarantee. Additionally, such an approach can deliver cost-effective responses to climate change.

Climate governance in India is driven by actors and institutions at multiple levels of government, including the national, state and local levels. It is shaped by a range of factors such as domestic political interests, pressures and influences, existing governance mechanisms and institutional constraints, among others. Yet it is not often informed by participative processes by which communities and local stakeholders can bring their knowledge and experience to policy formulation and implementation. Groups to involve strongly in future include panchayats, urban local bodies, local universities, youth, NGOs, community based organizations, informal and formal community groups such as the Self Help Groups, and think tanks, and especially women and marginalized segments.

2.2 Water Governance

The international network Global Water Partnership (GWP) defines water governance as *the range of political, social, economic and administrative systems that are in place to regulate the development and management of water resources at different levels of society.* Governance is a critical tool for improving the sustainability of water resources and services. In contrast to climate change, water is a national and not an international concern with the exception of cross-border water bodies, where it becomes a bilateral or multilateral matter. Thus, and also because it is a topic concerning local stakeholders water policy shows stronger local character in most aspects than climate change has so far. Since India faces increasingly acute water shortages, access to water exceeds being an essential basic need and becomes a matter of survival, which is pivotal to break the vicious circle of poverty. Good governance within the water policy therefore becomes critical in alleviating poverty.

Social	**Economic**
Equal distribution of water and services among various social and economic groups, and its effects on society	Efficiency in water allocation, its use and the role of water in overall economic growth
Environmental	**Political**
Sufficient flow of water of good quality is critical to maintain ecosystem functions and services	Equal rights and opportunities for stakeholders to Participate in decision making processes

Fig 3. Four fundamental dimensions of water governance *(Source: Securing Water for All, Development Alternatives, 2015)*

As per the Indian Constitution, the responsibility of water resources management rests with the individual states under jurisdiction extending to 'water supplies, irrigation and canals, drainage and embankments, water storage, and water power' as part of Schedule VII. Therefore, it is evident that

water governance in India is decentralized at the state level and the Indian constitution provided full authority to the states over water within their boundaries. The power, however, is subjected to the authority of the Central Government when it comes to regulate the development of inter-state rivers and settle inter-state water disputes. The Ministry of Jal Shakti Department of Water Resources, River development and Ganga rejuvenation (MWR) is responsible for laying down policy guidelines and programmes for the development and regulation of country's water resources.

The responsibility for the development and management of water resources lies within the state's administrative and physical boundaries. Different institutions such as regulatory authorities, water supply boards/departments, gram panchayats, irrigation departments, and public works departments are present within the state to manage the water resources. Although water is a state subject, the major financial resources for implementing national-level projects are provided by the national government due to water's importance for life, well-being and development. Hence, most of these policies and programmes are aligned to the vision and policies of the central government. State governments frame their water policies and provide funding from their own resources whenever necessary.

Water governance within the state works differently within the urban and rural settings. In rural areas, water resources are managed through the Panchayat Raj system. The Panchayat Raj system is responsible for implementation, operations and maintenance, funding, and the administration of water programs and projects. The system consists of three administrative levels:

1. District/ Zilla Panchayat: This constitutes the top level and has representation from elected and appointed officials. This Panchayat performs funding and local policy making.

2. Block/ Taluka Panchayat: Middle level and has representation from elected and appointed officials. Taluka has a dual role of obtaining funds and developing local policy; as well as working with the Gram Panchayat in various implementation measures.

3. Village/Gram Panchayat: The bottom level entity generally consisting of 10 villages (depending on total population) which has elected representatives only. Its functions include implementation, monitoring, maintenance, and operations.

As far as urban areas are concerned, the governance arrangements differ from state to state. Water is managed differently within the political and bureaucratic bodies such as districts and municipalities, consisting of both elected and appointed officials and responsible for policy-making, implementation, and service provision. Service provision includes water infrastructure building and maintenance, water distribution, and other related tasks.

Non-state actors, who are vital to address water crisis, also contribute to water governance through various consultation processes on public policies governed by the one of the basic principles of meaningful intensive participation as charted out by the National Water policy. The 2012 National Water Policy (NWP) encompasses a common integrated outlook with improved governance in the use of water resources and the provision of water services, guided by common approaches such as community participation to deal with planning, development and management of water resources. The NWP clearly reflects that water needs to be managed by the state as a common pool community resource under the public trust doctrine to ensure sustainable development, equity and social justice for all, with an emphasis on water treatment and access to safe drinking water as a pre-emptive need for economic betterment. NWP thus suggests that the service provider role of the State needs to be gradually shifted to that of a regulator of services and facilitator for strengthening the relevant institutions. Subsequently,

recommendations on major issues including enhancing water availability, fair water pricing, groundwater as well as demand management (through efficient water use practices), conservation, supply, information systems, disaster management and several institutional arrangements (like Water Disputes Tribunal) have been mentioned. Climate change adaptation also forms a subject in the NWP.

However, the success of NWP depends on the development and maintenance of a nation-wide consensus and thorough commitments to its underlying principles and objectives. In order to meet the demands, conserve resources and ensure equity, the NWP focus needs to be shifted from large, centralized, capital-intensive 'water resource development' projects, to small, decentralized, local, community-led, water-harvesting and watershed-development programmes; along- with severe restrictions for groundwater usage.

Through the National Water Mission (NWM) under the aegis of the National Action Plan on Climate Change and introduction of the Twelfth Five Year Plan, water was identified as a major challenge for sustainable development. The Water Mission has broader and more diffuse objectives including water conservation, minimizing wastage and ensuring more equitable distribution both across and within states along-with the promotion of basin level integrated water management. The National Water Mission provides focused attention to vulnerable and over-exploited areas, and seeks to adopt better water management practices including rainwater harvesting, micro-irrigation, and wastewater recycling. A large number of central and state government actors, research institutes, businesses, NGOs and communities are involved in on-going water management initiatives to implement the National Water Mission across the country.

Agriculture, which accounts for 14% of nation's GDP, and 11% of its exports, and provides employment to about half our workforce and raw materials for various applications in the industrial sector, takes an important position in the NWP as well as National Mission for Sustainable Agriculture (NMSA) under the NAPCC. Food security links very closely with water security and hence the governments have the prime responsibility to ensure food security and food production, which are largely dependent on irrigation. Adoption of compatible agricultural strategies and cropping patterns, improved water application methods and watershed management are the few highlights within the NWP whereas NMSA aims at making Indian agriculture more resilient to climate change through development of new varieties of climate-stress resistant crops, new credit and insurance mechanisms, and improving productivity of rain-fed agriculture. The main focus of the NMSA is to ensure food security and protect land, water, biodiversity and genetic resources for sustainable production of food. Competition among agriculture, industry and cities for limited water supplies is constraining the development efforts in many countries including India. In India, the agricultural sector uses 80 per cent of available water resource potential, however it is unable to pay for the amount of water it needs, as by the cities and industries. With growing populations and economies, the competition for limited supplies is most likely to intensify, resulting in potential conflict situations among water users within rural and urban settings. This puts an enormous pressure on agricultural policy-makers as well as farmers. The very recent agriculture law focuses on attracting private investments, bridging financial gaps in building infrastructure and supply chains for farm produce in national and global markets.

2.3. Existing inter-linkages and gaps

Water policy and management is at the forefront of climate change adaptation measures. The policy space that climate change has created appears to have been appropriated by the central government through the National Water Mission. The NWM of India, one of the eight Missions created under the National Action Plan for Climate Change, is developed primarily to manage rising agricultural water demand, as well as drinking water and industrial needs, in line with the sanctioned discourse within government while being climate change autonomous. However, climate change specific strategies do not have a substantial stand in NWM and a vast majority are classified as autonomous adaptation, which means 'adaptation in response to experienced climate impacts, without planning explicitly or consciously focused on addressing climate change.' NWM emphasizes research studies on all aspects related to impact of climate change on water resources including quality aspects.

The climate change related recommendations under the NWP revolve around incentivizing states to increase water storage capacity and revival of traditional water harvesting structures and water bodies, increased water-use efficiency (for demand management), infrastructure planning and stakeholder participation. The water demand management strategies so far mention economizing agricultural systems through maximizing value from water and avoiding wastage. An institutional arrangement with focus on both supply- and demand-side dimensions of water use, coupled with designing demand- and user-focused approaches that influence behavior in urban and rural settings, needs to be established at the national level.

Adaptation in the India's water sector is emerging, primarily in the form of building adaptive capacity and no-regret type activities as response to multiple factors. More robust adaptation strategies including increasing water storage, better water use efficiency, proper demand management, incorporating coping strategies for climate change, and enhancing the capabilities of community to adopt climate resilient technological options are urgently required to be formulated. The importance of meeting short-term water usage and demand priorities has been vital to the Indian policy makers; however climate change responses need to be well inter-woven with substantial actions within the niche.

Integrating climate change into national water policy (and vice versa) poses significant institutional and developmental challenges. But, these are inescapable. The task of developing appropriate water policies in adapting to uncertain climate change impacts is tedious and requires long-term integration of economic, social, and environmental factors, with appropriate governance structures and approaches to optimize outcomes. Yet, it must be taken up. The efforts will pay off in a water-scarce, climate-vulnerable India.

As the overall demand for water rises above supply in many regions, the effective governance of available water resources will be the key to achieving water security in the wake of climate change. Institutions for multi-level climate governance in India are still emergent and despite an overall top-down approach, there is increased autonomy at the local and state levels. Limited political as well as financial support for implementation and coordination challenges are other issues with undermine the climate and water governance. It is essential to strengthen water governance through establishing better mechanisms and institutions to facilitate vertical (among levels of government) and horizontal (among sectors, and geographies) co-ordination, and to resolve conflicts.

Henceforth it is evident that the impact of climate change on water resources availability needs to be well-factored into water management related decisions, policies and actions. These efforts could be

backed by large scale and comprehensive mapping of water resources and the effects of climate change on the availability of these resources. A coherent policy on water and climate with a pragmatic approach and co-benefits emerges as a need, which would further require a range of policy changes and transitions that could be implemented overtime.

Governance is a mechanism of decision-making and the process, system and structures by which decisions are implemented (or not implemented) thereby guiding the social, economic and political relationships. The relationships could be viewed between government and market, government and citizen, government and private sector and voluntary organisations, elected and appointed officials, levels of governments (Union, state and local), and between legislative and executive structures (Ramachandran, 2015). As per the National Water Policy, "*Good governance through transparent informed decision making is crucial to the objectives of equity, social justice and sustainability. Meaningful intensive participation, transparency and accountability should guide decision making and regulation of water resources*". Similarly, the guiding principles for SAPCC as developed by the central government mention *"building broader stakeholder engagement to maximize the perspectives and to increase robustness of analysis"* and also identify the importance of a participatory approach to enhance broad ownership of the process and "*ensure its quality, consistency, relevance, pertinence and transparency*" (CSE, 2018).

Participatory approaches in the decision-making process are one of the core principles of good governance and may be practiced at all levels of planning. However, the extent or nature of participation may vary by various actors including citizens, elected officials, academics, civil society, and other stakeholders. Participation in the context of policy formulation (or implementation) means contributing to development, benefiting from development and taking part in decision-making about development, which could be realized through activities facilitated by authorities as well as activities initiated or generated by the people themselves.

Promoting inclusive and participatory climate policy development plays a crucial role in advocating for climate action and improving climate governance at the national and local levels, especially when it comes to safeguarding poor and vulnerable people. Under the aegis of international climate commitments, national governments were provided with a responsibility to facilitate citizen participation and engagement through ensuring access to information and opportunities to participate in decision-making processes. Since then the need for public participation has featured prominently in calls to climate action.

It has also been suggested that people want civil society groups to be included in climate policy making decisions, and believe that the process is more legitimate when civil society is involved (Moses, 2016). This is based on recognizing the fact that civil society could use their links with local communities to strengthen the number and type of initiatives used to feed public input into wider policy debates and enable inclusive decision-making.

Public participation increases the likelihood that actions and services provided by governments adequately reflect the needs of the people and that developmental benefits are equitably shared. This brings qualitative improvements in planning, decision-making and implementing. Public participation is also recognized as one of the core principles of sustainable development, owing to the equitable sharing of resources and benefits. This is the major reason government authorities; international development agencies and civil society have renewed their interests in stakeholder engagement.

Participatory approaches highlight various issues of cross-cutting nature and are integral to provide an

institutional framework for integrated planning that could help address the cross-cutting issues and deal with the problems of conflicting objectives of development. The prime element of any policy is the people who are the beneficiaries and if people are not involved in the policy development process their needs would not be appropriately identified and would not be clearly reflected in the development initiatives.

Table 2. Participation needs and benefits

Participation needs	Participation benefits
- Lowering emissions intensity of its Learning about people's needs, attitudes, aspirations, ability to pay, desires, priority, possible contributions and help, how they could be affected by growth or changing land use and activity patterns, etc; - Systematically evaluating existing programs, policies, and services provided; - Considering actions taken, services provided and projects undertaken better reflect the needs and problems of the people; - Utilizing people's experience and community resources; - Avoiding bias in preparing plans (especially when value judgment is involved); - Increasing people's understanding of common problems and their effects on various groups in society and organizations in the community; - Mobilising citizen support for public decisions (for example, tougher measures that may affect many people and transport demand management); - Setting development priorities; - Keeping people better informed and enhancing a greater understanding about public actions; - Creating a sense of belonging among all stakeholders; - Resolving social problems between different groups in society; - Empowering the poor and marginal groups in society; - Bringing transparency to decision-making and thus reducing scope of corruption.	- Improved governance; - Increased quality of the functions performed and services provided by public agencies; - Revitalization of democratic practice in general; - Maintaining the stability of society. When people are directly involved in the decision-making process, they become more aware of the possible problems and are more willing to live with the consequences than they are when decisions are imposed from outside. They become more aware of problems and tend to be less towards explosive situations or conflicts; - Guarding the public interest. To make public agencies more responsive to the needs of public and disadvantaged groups in society. Citizens can work as watchdogs of society; - Increased community cohesion and unity and capacity to reduce alienation of the individual.

Source: UNESCAP, 2003

To ensure long-term ownership of the plans and projects, it is important to ensure that state and local actors are deeply involved in the process to help build capacity for the future. Both the NWM policy and the eight NAPCC missions are considered to have been developed in a top-down approach that lacked stakeholder engagement. Hence, shifting of priorities to local, decentralized, small-scale, community-led adaptive water management and conservation could have been considered in the NWM and NAPCC planning processes.

Policy formulation is a complex process which can benefit from consultative approaches as well as multi-stakeholder engagement across multi-level governance structures to be truly sustainable. With the growing population and impacts of climate change in the form as droughts, floods and shrinking predictability of rainfall, water is becoming the most concerning issue in India's rural areas and a potential source of conflict. People-friendly and participatory approaches are clearly required to address this grave crisis. Strengthening the participation of all, in the identification, planning and implementation of policy solutions to their water needs is a step towards ensuring our nation's water security.

The constitutional amendments in 1990s strengthened the local governance within the water sector and confirmed that participation cannot be dissociated from decentralization, whereas clearly putting the elected institutions at the center of the existing participation framework as well as reinforcing that participation is not limited to central or state government-organized participation (Cullet, 2015).

Irrigation and drinking water supply were the two major sectors where participation was emphasized. The national water policies are extremely important as they directly refer to participation and specifically highlight community participation in the management of water projects and services including mapping of resources and water conservation efforts. Water in the NWP is envisaged as an economically valuable resource and needs to be allocated for efficient use.

Participatory approaches in adaptive water management policies are an evolving factor. The NWM was prepared by the Ministry of Water Sources through six subcommittees established under a High-Level Steering Committee, examining different thematic water issues. The six subcommittee reports were written by the current and former MWR officials. Sectoral specialists from the private and civil society sectors, as well as independent consultants, contributed to the specific sections of these reports. The first draft of the NWM policy was published in 2008, followed by workshops over two and a half years to solicit feedback from non-government actors. The NWM was finally approved in April 2011.

More meaningful participation of non-government actors in NWM could have strengthened the strategic directions to the policy. Studies suggested that consultation workshops during the NWM formation process provided relatively short time to discuss the multitude of issues. Numerous policy implementation challenges have also been identified.

State governments largely used a top-down policy development process, engaging experts from development agencies and the private sector to develop SAPCCs in line with the eight NAPCC missions as a thematic framework and taking into account state-level climate change vulnerabilities including the issue of water security. MWR later in 2015 advised the state governments to develop State Specific Action Plans on Water (SSAP-Water), solely focusing on state-level water management issues within the state-level context and requirements, including climate change adaptation strategies. The SSAP-Water formation process still continues today.

The 2002 NWP was updated by the MWR in 2012 with a number of subsequent water initiatives including the National Adaptation Fund, to finance adaptation projects at the state level; the Neeranshal

National Watershed Project for improving water management and agricultural production; the Pradhan Mantri Krishi Sinchai Yojana mission, aiming to increase agricultural productivity as well as field-level irrigation efficiency. These government initiatives were highlighted in India's Nationally Determined Contribution to the UNFCCC along-with the National Bureau of Water Use Efficiency, which is yet to be operationalized whereas the proposed National Water Framework Bill was drafted in 2016. The NWP also had narrow stakeholder engagement, limiting considerations and opinions of state governments as well as other stakeholders.

With a view to bridge the gap between the policy formulation and implementation, it is essential to strike a right balance between central top-down policies and subnational bottom-up approaches to complement the adaptive water management initiatives. Involvement of people through appropriate institutional mechanisms at the local level forms an important component and requires a range of robust dialogues for a more active policy and strategy. It is only in recent years that a consciousness of the importance of stakeholders and shareholder participation has begun to emerge with focus towards the users i.e. communities and people. In Karnataka, the Forum for Village Republics (Gram Ganarajya Vedike), a group of volunteers launched a state-wide campaign for the empowerment of the Gram Sabhas (Ramachandran, H. Vision 2020) which are the assembly of citizens responsible for improving the service delivery mechanisms in rural areas, encouraging local self-governance.

Sustainable policy development calls for imperative participatory approaches in order to have truly bottom-up decision-making processes for designing, developing and implementing coherent policies. This also will potentially help improve the water governance across multiple vertical and horizontal levels. The recent devolution to local bodies has helped as a major plank of governance reform, both at the Central and the State level and could definitely be strengthened over time.

Box 4. Recognizing the urgency to hasten the reform process and improve governance of the nation, NITI Aayog has put forth the following recommendations:

◆ Transparency

  ◆ By 2020 the Government of India would not only put in place a policy framework for a transparent and responsive (to people's needs) government but also nurture an environment where citizens will play a leading role in decision making and developmental activities.

◆ Governance

  ◆ Governance needs to be radically redesigned with political revitalization, providing more space for civil society to adequately fulfill crucial future-building tasks.

  ◆ Government will essentially play a strategic role in the development of policies and plans relating to the development of physical and human resources, as well as facilitate arenas of people's forum for wider participation in policy choices.

  ◆ Governance changes could produce tense social and political equilibrium, which will need to be addressed jointly and collectively by multiple stakeholders. A more active role from a combination of non-governmental organizations and positive elements from the bureaucracy and the political executives could help address such situations.

  ◆ Establishing a robust mechanism for public scrutiny of government functioning.

◆ Participation and decentralization

  ◆ Participation and decentralization share a symbiotic relationship. Some level of gap between people's expectation of their role in decision making and the real world situation may work both as a propeller and as an impetus for greater decentralization.

  ◆ Decentralization design provides people to express their views and see them translated into future policy; that enables citizens to participate in policy formulation and not merely pre-selected choices.

  ◆ Streamlining of processes and systems as well as increasingly deconstructing the power centers for a better governed state to help remove redundant layers in government functioning is vital. Thus, improving the quality and import of legislations which could be easily followed by the common people.

  ◆ An active citizenry and effective participation can only be achieved by enabling access to information all citizens.

Source: NITI Aayog, Vision 2020 document on Governance and people's participation

4.1. Water demand management

Climate change is posing serious risks through direct impacts on water resources and therefore numerous water supply and demand management strategies as well as institutional reform measures are suggested to address these impacts. The key elements of adaptive water management strategies include decentralized and smaller-scale supply, while also considering the challenge of managing rising water demands owing to population growth and economic development.

In order to ensure water security for all users, a water sector transformation is required. Apart from improving the water supply through measures such as rainwater harvesting, watershed development and eliminating inefficiencies and leakages in the system, there is a need for water use efficiency and demand side management across sectors. Water is a shared resource and thus calls for a shared responsibility of stakeholders including government, private sector, civil society and communities.

The Government of Gujarat through its Water and Sanitation Management Organization (WASMO) implemented a decentralized, demand-driven and community managed drinking water supply programme in 2002. The initiative brings together the community through Pani Samitis (local water committees), NGOs, and International organizations, with technical assistance from WASMO to ensure equitable availability of safe drinking water to the community. By promoting the Gram Panchayat and Paani Samiti to take the lead to plan, manage, implement, operate and maintain water supply schemes in villages, WASMO became a successful decentralized model of service delivery with efforts leading to provision of safe drinking water to more than 70% households in the State through 18185 Pani Samitis. Being administered with community participation, the initiative serves as a sustainable system of providing clean water to rural households and has established a financially sustainable model for water provision, with larger impacts observed in terms of decrease in girl students' dropouts, reduction in water borne diseases and better living standards of the community (NITI Aayog, 2017). Engagement of communities in the implementation process reduced the need for government support, making the program self-reliant thereby ensuring social sustainability through maximized use of existing infrastructure.

4.2. Urban-rural conflicts

NITI Aayog in its vision 2020 recognizes the fact that "*the most diehard proponents of centralism that in this increasingly worsening scenario of water scarcity, centralized and inefficient systems of water management will not work. Civil society (in the sense of the people concerned, i.e., beneficiaries and those who are likely to be adversely affected and the community in general) plays little or no role in the planning and implementation of such projects. For example, the Irrigation Acts vest the management and control of waters in the hands of the state, and project planning and implementation are largely internal activities of the state. In the absence of institutional arrangements for consultation and grievance-redressal, the process of displacement, resettlement and rehabilitation often generate serious dissatisfactions leading in some cases to conflicts.*"

Improving the sustainability of water resources and meeting the rising water demands in fast-growing urban areas, against the backdrop of changing climate, has also led to increasing water-use conflicts

with the co-dependent rural areas. The current regulations for drinking water supply are different for urban and rural areas with different supply norms for rural and urban residents, same as the treatment for the surface water and groundwater. The governance structure becomes further challenging as water pollution is viewed as an environmental matter and water usage as a water sector matter.

Water governance is often recognized as the key reason as well as a potential pathway to resolve such local conflicts; appropriate policy mechanisms to address the urbanrural conflicts at local level are needed to be developed. The importance of urbanrural linkages and stakeholder partnerships have also been recognized in the recent global policy agreements, including the Sustainable Development Goals (SDGs). The pattern of sustainable development is expected to reduce the urbanrural duality and build a rural urban continuum in living standards and infrastructure.

Bangalore Urban Zilla Panchayat challenged the amended section 205 of the Karnataka Panchayat Raj Act which enabled the government to create a kitty of the 3 percent cess collected on stamp duty from all over the state and uniformly distribute it among the Taluka Panchayats on the basis of their population. However, this deprived the Taluka Panchayat of their rights over the stamp duty cess collected in their respective jurisdiction, majorly affecting the Urban Taluka Panchayat, which collected a larger share of the cess. They had to now share these budgetary resources with their rural counterparts whose contribution was much less and thus challenged this decision. Such developments in schemes and programmes could result in urban-rural dichotomy especially when villages are merged with towns (Ramachandran, H. Vision 2020).

4.3 Solar pumps

With groundwater being the main source of irrigation across India, technological innovations that could protect farmers and their livelihoods are crucial for the agriculture-based economies, especially in the wake of changing climate. Electricity-based pumping of groundwater using subsidized electricity is a common phenomenon, which often leads to over-exploitation of groundwater. Diesel-powered pumps are expensive and polluting, thereby reducing farmers' profit margins and increasing the agriculture's carbon footprint. Provision of affordable and sustainable irrigation services, thus becomes a pressing concern in India. Solar pumps or solar powered irrigation systems thus emerged as an alternative to conventional irrigation solutions.

In the village of Dhundi, Gujarat the state government provided farmers that owned pumps incentives to use solar energy, to pump only the required amount of water for irrigation and thereafter generate electricity to sell back to the grid. The subsidy was mainly designed to discourage the overuse of groundwater and led to increase in farmers' (who owned pumps) income. In 2015, six farmers came together to form a farmer-led cooperative, Solar Pump Irrigators' Cooperatives Enterprise (SPICE), to capitalize on the opportunity. The farmer cooperative earns income from selling water for irrigation as well as excess electricity back to the grid, while benefiting also farmers using the water for irrigation, as they are able to buy water at lower prices. The solar pumps benefited both water sellers and buyers in the irrigation market. The Dhundi example shows how encouraging community ownership and providing financial support could promote clean energy, providing farmers with an additional 'climate-smart' income source and encouraging a sustainable and buyer-friendly irrigation market. However, incentives need to be in place to pump only the amount of water required as well as promoting the sale of electricity back to the grid, or there is a risk of groundwater exploitation (Climate and Development Knowledge Network, 2020).

5. Influencing policy factors for sustainable water management

A range of policy factors need to be considered while managing the water resources sustainably. These include institutional processes, demand and supply side management, distribution systems and traditional as well as innovative solutions, with participation forming the center of all these factors.

Water scarcity situation arises as a consequence of high rate of aggregate demand from all water-using sectors compared with available supply, under the prevailing institutional arrangements and infrastructural conditions. The estimated water gap for India as per the 2030 Water Resource Group is an alarming 50 per cent (S Kumar & Bharat, 2014).

Climate change will have complex implications on weather patterns leading to unpredictable water availability, exacerbating water scarcity and contaminating water supplies. This will further result in an increase of competition for water, even conflicts. Changes in water availability will also impact health and food security; triggering displacement and political instability. Henceforth, an integrated view on water is required to devise sustainable agricultural and economic systems that support deceleration of climate change impacts on water resources, with also protecting people from extremes and better adapt to the challenges.

Water has a clear linkage to all the three development dimensions: Environmental, Economic, and Social. The challenges necessitate the need for a sustainable policy regime that facilitates Integrated Water Resource Management (IWRM) for efficient use of water. The diagram below shows that we need to work on at least three policy areas to achieve sustainable water security; which include water availability and access; water consumption patterns and water procurement systems. The below described policy areas capture today's needs with sustainability forming an underlying foundation across the three dimensions.
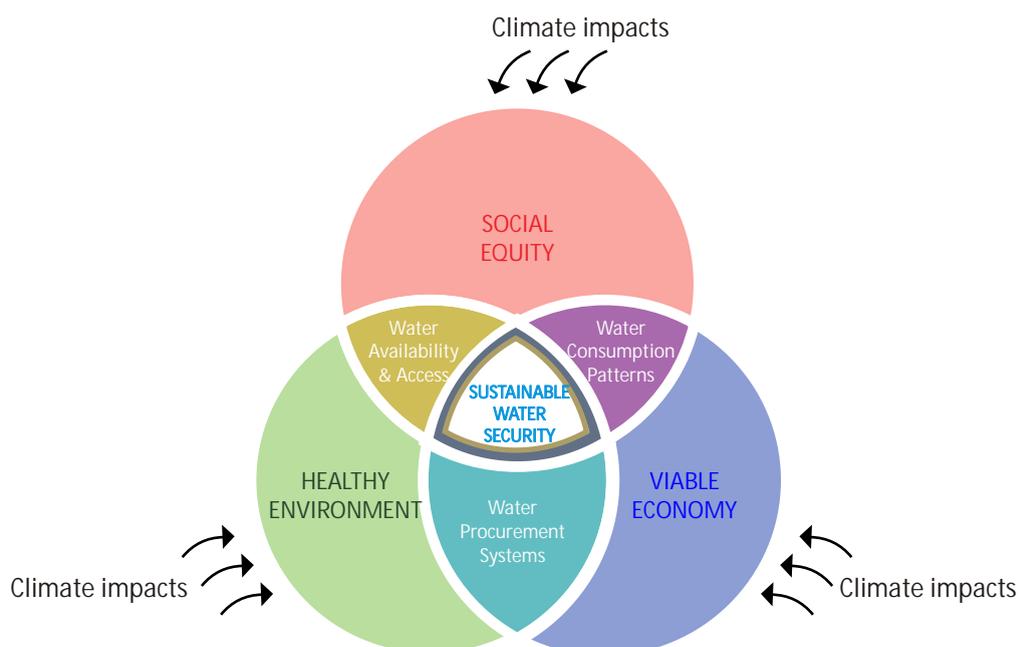

Figure 4. Sustainable Water Security dimensions *(Source: Securing Water for all, Development Alternatives, 2015)*

Key considerations based on the Venn diagram as highlighted in the *Securing Water for all*, 2015:

◆ Economic balance is the most vital condition for sustainability. Apart from the national imperatives and supply side management, climate change is an emerging factor that needs to be considered while developing the water production and treatment strategies. The investment choices for the water supply for agriculture can impact the relative importance of different water-intensive technologies.

Box 5.

"We do not have to worry about policy incoherence, if the people are truly involved in deciding their own water security arrangements."

Source: Securing Water for all, Development Alternative, 2015

◆ Equitable access to water is the right of all, regardless of any context- urban or rural, rich or poor, powerful or marginalized. Equity acts as a central component to ensure sustainability of any measures taken, with focus on participatory approaches for sustainable policy development.

◆ Environmental sustainability for inter-generational equity needs to be visualized by the decision and policy makers to devise robust and effective policy initiatives, to achieve the goal of water security.

5.1 Institutional mechanisms and governance structures

Governance is viewed as the processes involved in decision-making which take place through institutions (including mechanisms, systems and traditions). These processes and institutions of decision-making involve multiple actors.

While water management refers to the government making decisions to manage water systems; water governance includes both internal and external processes through which societies manage their water resources. Through water governance mechanisms, decisions are transformed into water management actions, generating outcomes. Good water governance is the key for the sustainable management of water resources, which is important for the realization of SDGs (particularly SDG6). Elements of sustainability in water governance will thus lead to the actions promoting sustainable management of water resources.

Systems of decentralized water solutions, in terms of operation and maintenance of water harvesting structures and small irrigation schemes, existed throughout India up-till mid last century. Conversely, this weakened during the latter part of the last century and water supply as well as management came under the control of the state, even at the local level. The World Bank recommends that ownership of rural water supply in India should be transferred to communities through appropriate governance and communication mechanisms at the local level .

Existing institutional mechanisms and governance structures should be evolved through meaningful public participation, building on non-discrimination and equity, participation and empowerment, transparency and accountability as well as the do-no-harm principle.

5.2. Demand Side Management

Water crisis in India is primarily due to mismanagement as well as inefficient use of water resources and not due to lack of water availability. The centralized water management model has significantly reduced the sense of responsibility amongst citizens to manage their water. Considering the increasing population and growing water demand, it would be extremely difficult to raise financial resources to meet the water needs as well as to ensure clean and safe water with reduction in increased pollution levels.

Groundwater on the other hand is the lifeline of India and constitutes 85% of drinking and 70% of irrigation water. However, growing population has led to higher, inequitable and potentially unsustainable extraction of ground water for irrigation and domestic needs, without adequate understanding of the variations in underground water quality. With increased variability in precipitation and more extreme weather events caused by climate change, availability and dependency on groundwater has largely declined groundwater levels. This merges a need to arrest declining groundwater levels with improved technologies of water use, efficiency in usage and community involvement in managing aquifers, with incentives for ground water-use efficiency.

Participatory, efficient and sustainable water management is the key to meet the challenge of the snowballing water crisis. Accountability of overall water management, from water conservation to water pollution lies on every person, household, organization, company or community, who need to contribute to this effort by mobilizing relevant financial and human resources.

The objectives of demand side management should be to reduce water and energy consumption to sustainable levels, provide for fair water distribution in terms of basic access for all as a right and contribute to climate resilience. Technical solutions like low-flow taps are as important as sustainable behavior like avoiding overuse. Information and communication about projected water availability in surface and ground sources throughout the year, tracking consumption and over-consumption through sensors, loggers and displays embedded through the watershed and aquifers systems are key enablers for demand side management. The selection of appropriate technical tools and incentives to guide behavior should be arrived at in a participatory way.

5.3. Distribution systems, irrigation practices and water-use efficiency

The inequitable distribution and limitation in unified perspective in planning, management and use of water resources has resulted in its wastage and inefficient use. This coupled with low public consciousness about the overall scarcity and economic value of water, has further worsened the situation. This calls for efficiency in water utilization and a public awareness of the importance of its conservation.

The National Commission for Integrated Water Resource Development (NCIWRD) has assessed that in India about 83% of water is used in irrigation and the remaining for domestic, industrial and other purposes. The existing irrigation infrastructures and distribution structures are inadequately maintained and managed leading to wastage and under-utilization of available water resources. This has resulted in a widening gap between the irrigation potential created and utilized. Despite huge investments, irrigation practices have not been able to increase the yield, irrigated area and technical efficiency in water use. As much as 60% of the water diverted or pumped for irrigation is wasted.

The current water policy needs to establish a clear inter-linkage about reduction of distribution losses is significant to the availability of water and will thereby lower the water prices. Efficient handling of water both on the supply side as well as on the demand side will subsequently reduce the pressing need for large scale projects attracting huge investments. Water pricing in turn could also help people adopt measures which ensure efficient and economic use of water resources. If this could be translated into profits, both governments and farmers are likely to invest in efficient and water saving technologies which enhance water productivity.

Increased water productivity, especially the value produced per unit of water, could be an important pathway for poverty reduction in water productivity. However, the adoption of techniques to improve water productivity requires an enabling policy and institutional environment that aligns the incentives of producers, resource managers, and society and provides a mechanism for dealing with trade-offs. Thus, enhancing water use efficiency through the adoption of climate resilient agronomic, technological, management, and institutional approaches could prove a boon.

Regulation of water is also of immense importance to ensure the sustainability of human uses. This represents a major challenge in a context that water regulations have been largely conceived by either the state for control of water for public purposes, or by individual landowners with unrestricted control over groundwater found under their land. Additionally, there are a number of interstate and water sharing disputes between states, which need to be attended and are not possible to address without relevant institutional models.

Holistic and inter-disciplinary approach to water as a resource and to water resource allocation related issues need to be addressed, while ensuring sustainable financing to maintain and use existing water

infrastructure. Policy-makers need to rethink about the incentives, regulations, permits, restrictions and penalties that will help guide, influence and coordinate as to how people use water. At the same time these policies need to encourage innovations in water-saving technologies.

5.4. Technologies and traditional systems

Rainwater harvesting systems are one of the major adaptive water management techniques. Traditional water-harvesting structures in India which served the collection and storage of fresh water in both rural and urban areas have been severely deteriorating in most parts of the country. The other conventional technologies like centralized system of wastewater collection and treatment are resource, capital and energy intensive. Adaptation of traditional practices requires integration of traditional knowledge with new locally appropriate systems and approaches. These approaches include participatory watershed development projects, groundwater recharge and regulation, conjunctive use of surface and groundwater, urban and rural rainwater harvesting, small-scale storage including check dams and field bunds, on-farm water storage and reuse, and the cultivation of less water-intensive crops.

The NWP mentions promoting alternative technologies to reduce energy demand as well as encouraging community involvement towards the goals of improving the water use efficiency. Water technologies are central and basic to many aspects of water resources development and management, operation and are multidisciplinary in nature.

Government plans and programmes are supporting farming communities to harvest rainwater using farm ponds and water conservation measures. The programmes still require planning and executional quality for substantial improvement to yield desirable outcomes.

With the increasing climate impacts, recent agriculture technology inventions have the ability to adapt to these changes to partially offset the adverse impact, through changing cropping patterns and practices, developing new varieties and adoption of water conservation practices. Employment generation from crop diversification could enable rural economies to adapt to the right technologies and achieve an inclusive growth pathway. Other technological innovations like drip irrigation could reduce the water demand of agriculture by increasing the efficiency and effectiveness of water use. Solar pumps have also proved vital to reconfigure India's energy-irrigation nexus. Increasing the leakage and controlling the leakage demands efficiency is also being addressed through technological interventions.

On the other hand, excessive focus on extraction technologies and infrastructure network, have led to increase in the demand-supply gap for water. Therefore water conservation and measures to attain sustainability need to be encouraged through technological interventions.

A major shift in the approach towards water resource management from technologies to systems that incorporate traditional practices, local materials and are managed as well as maintained by local communities requires to be established. The Gram Panchayat as well as the local community needs to be involved at all stages of discussion, planning, implementation, management and maintenance. Policy principles, innovative technologies and implementation strategies for water management could help lay the foundations for a water prudent society. In order to better manage water sources, participation plays a prominent role and strengthens ability to act collectively and ultimately.

Considering water is essential for maintaining ecological balance and for economic as well as development activities of all kind. As India already is under a water-stressed situation, the issues of water scarcity need to be urgently addressed or they would be further intensified. The planning and management of this critical resource has become a matter of the utmost urgency. Significant political, financial as well as technical improvements in the water sector have been taking place; however, managing the ever-increasing demand of water in India still requires a paradigm shift. Further, the wide temporal and spatial variations in availability and quality of water may increase substantially due to impact of climate change, thus aggravating the existing water crisis and incidences of water-related disasters, such as floods, droughts, and high erosion. Meaningful and effective public participation allows for no- or low-regret solutions that could be adapted over time as underlying conditions change. The success of the national water policy depends on the development and maintenance of a national consensus and commitments to its underlying principles and objectives. Water being one of the most climate-sensitive sectors, water policies need to ensure the representation, participation, behavioral change and accountability of all stakeholders, including the people, private sector and civil society. The autonomy of community institutions required to be strengthened during development of community participation policies in water and water-related services. NWP 2012 emphasizes on community based water management with institutions created at the village level, but it is important to understand that the communities are already exposed to multiple stress factors including infrastructure deprivation and financial susceptibility as well as additionally burdened by climate-related events, and therefore community-led initiatives need to significantly be incentivized as well as recognized. The existing policy framework does not provide a clear incentive and sustainable financing structure as well as criteria for efficient and sustainable water use, resulting in poor maintenance and limits further investment. Limited water charging and energy subsidies for groundwater pumping have been driving severe depletion of country's water resources. The economic, social and environmental value of water would keep changing with the deepening climate crisis and this changing nature needs to be kept in mind during policy formulation.

Another concern is the sectoral approach towards water management. The segmented approach towards managing water has resulted in narrow coordination amongst various stakeholders. Even at the local level, departments often work in silos and when coupled with ineffective coordination mechanisms

as well as a lack of personnel and capacities hampers horizontal coordination among national-level ministries. The NWP 2012 also recognizes that the water projects in the country involving multiple stakeholders are planned and implemented in a fragmented manner, and that there is a need for sustainable integration. For instance, the irrigation projects are planned independently of water supply schemes and groundwater and surface water projects are planned separately with difference in regulating mechanisms.

Currently the community participation in water management policies is mainly included across three key sectors: irrigation management; management of rural water supply systems; and urban water management. The participation on ground is however limited to the tertiary level for irrigation schemes and village water distribution in case of rural water supply schemes; in urban water, there is still no positive experience so far with community participation. Also, different states have different rules regarding community participation in water management in terms of roles and responsibilities with a focus on water efficiency and cost reduction. However, the need of the hour is to focus on decentralized governance and management of services as well as improving system performance.

In order to benefit the people and the environment, integrating national sectoral policies for climate change, water and other relevant sectors is central to the sustainable development agenda. The policy formulation in water sector is required to be driven by scientific knowledge and information on resource availability, existing usage, nature of climate impacts, future demands for water, and appropriate as well as specific solutions. This would also help in aligning the water and climate change policy objectives at a larger level. The participation of communities across all these levels is extremely crucial for incorporating their traditional knowledge during the various developmental processes as well as ensuring the sustainability of devised solutions/policies. Economical-efficiency in such approaches comes as a valuable co-benefit.

A number of factors have been identified for promoting more cross-sector policy development; this includes stakeholder engagement through multi- sector consultations, iterative policies to build on the experience and independent as well as strong review and enforcement mechanisms. These are also the factors that undermine water governance and ensure coherence with other policy items.

Water governance structures in India are still emerging and indications of increasing autonomy at the local and state levels is observed although an overall top-down approach to multi-level climate governance. Distributed governance is the key to success of creating improved water management systems. A strong participation of multiple stakeholders through multi-level engagement processes, supported by appropriate institutional and legal framework, is significant for effective policy formulation and implementation as well as decreasing the probability of potential conflicts.

To conclude, a human rights-based approach supported by good governance is at the core of water security. This approach has a potential to address critical gaps and bottlenecks, as well as emphasizing the establishment of regulatory mechanisms for efficiency, participation and accountability. The renewed attention to water security by the national government provides a window of opportunity to advance the much needed "paradigm shift" for water management in India.

7. Recommendations

Concluding from the above analysis the authors identified the following recommendations for water policy in the context of climate change:

Strengthened decision-making

◆ Strengthening water governance through establishment of better mechanisms and institutions with well-functioning coordination across sectors and at different levels, will be the key to sustainable management of water resources.

◆ Effective governance forms central to achieving water security for all and could be achieved through institutional redesigning, providing more space to stakeholders.

◆ Promotion of bottom-up approaches within policy formulation process builds on the experience and knowledge of local stakeholders and people, improving transparency, stakeholder participation, successful and cost-effectiveness implementation of solutions.

◆ Decentralized governance and management of services as well as improving system performance to increase water efficiency and reduce costs.

Stakeholder engagement and public participation

◆ Enable public participation in governance in inclusive, well-informed, deliberative and influential ways, addressing power imbalances among different segments of the public in participatory processes - best in a participation framework, building on approaches like multi-stakeholder collaborations and public participation processes building on non-discrimination and equity, participation and empowerment, transparency and accountability as well as the do-no-harm principle.

◆ Various private enterprises, CBOs, water users, NGOs and local communities play important roles in the management of water and delivery of water services and should be included for many reasons such as their important knowledge contributions, the sustainability and coherence to other policies that they bring and even economic efficiency. Effective government regulations (including fighting corruption) are needed to enable stakeholder engagement, allowing governments of different levels to harness stakeholder participation, especially for safe, sustainable water supply.

◆ Provision of role clarity: a) which level of governance is responsible for different elements of water policy (from cross-border water conflict at national level to small water body management at local / village level) with the respective stakeholders involved and b) adequate sharing of responsible roles within the stakeholder cooperation (governments have duties to protect communities and cannot overburden them with responsibilities).

◆ Closing the gaps in current research including the lack of common understanding of public participation for climate adaptation in water sector and across other disciplines.

◆ Recognizing community-based interventions to promote participation and lesser the burden, while understanding the fact that they form the most vulnerable sections of the society.

◆ Awareness generation and capacity building of stakeholders on policy tools as a strategic approach to enhance participation and support decision making at both local and national level.

Improved integration of water and climate policy

- Creating coherence between climate change, agriculture, development, biodiversity, energy and many further policy disciplines with water policy in all four types of integrative institutions: constitutional mechanisms and legislation; horizontal and vertical coordinating mechanisms; lead agencies; and advisory, consultative, and review bodies all in order to implement coherent action on the ground.

- Incorporating strategies for climate change across all policies for planning and management of water resources.

Financial mechanisms

- Increase investment in the expansion of water supply, water demand management and climate change adaptation measures in the water sector.

- Putting in place appropriate cost recovery mechanisms to contribute to sustainable financing flows.

- Create and/or direct access to finance for climate change adaptation in the water sector.

- Introduce clearer incentive structures to improve the efficiency of water use. This includes removing perverse incentives, improving allocation arrangements, and considering appropriate water charges.

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