PRACTITIONERS' DIALOGUE ON CLIMATE INVESTMENTS

Strengthening Climate Resilience in Industrial Parks: A Cooperative Approach in Water Management

Federal Ministry for Economic Cooperation and Development

implemented by giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

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Author:	R. Hrishikesh Mahadev
Organization:	INTEGRATION ENVIRONMENT AND ENERGY GmbH
Contact:	hmahadev@integration.org

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Content

Abbreviations

APIIC	Andhra Pradesh Industrial Infrastructure Corporation
BOD	Biological Oxygen Demand
COD	Chemical Oxygen Demand
CETP	Common Effluent Treatment Plant
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
INDC	Intended Nationally Determined Contribution
SPV	Special Purpose Vehicle
TDS	Total Dissolved Solids
TSIIC	Telangana State Industrial Infrastructure Corporation
UNFCCC	United Nations Framework Convention on Climate Change

Foreword & Acknowledgements

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Executive Summary

Water is one of the most important components of life sustenance on the planet and it influences the climate as well as being affected due to changes in climate. Water also forms an important component of the Intended Nationally Determined Contributions (INDC) submitted by countries in the lead-up to the 2015 Paris Agreement. About 92% of countries submitted INDCs indicated water as foremost adaption measure. Droughts are very much prevalent in many of countries near the equator and tropic of Cancer / Capricorn. To reduce the impact of drought in industrial parks and industries, water management should be considered. But, there are many barriers at the policy level, which need to be addressed to take up private investment in climate change. These include knowledge barriers, institutional, technical, regulatory and financial barriers.

To address the above mentioned issues and showcase through pilot projects, two case examples from India were selected and policy recommendations are made covering the aspects of planning and standardisation, data management, capacity development, water-energy-climate nexus, promotion of technology, formation of Social Purpose Vehicle (SPV), and financing covering freshwater, water adaptation fund, grants, tax benefits, faster approval for grants, risk management, promotion of energy efficiency and private sector involvement in Water Management. This policy recommendation also covers improved regulatory framework and better operation and maintenance of the proposed infrastructure.

1. Introduction to the Policy Brief

All life depends on water. Water is the primary medium through which climate change influences the earth's ecosystem and thus many sectors will be affected due to climate change impacts on the availability of water including agriculture, industries, and hence affecting livelihood and society. It also influences the health, food production and security, water supplies, sanitation, energy, industries, and the entire functioning of the eco-system and hence the entire economic activities of regions and countries. Thus, there is an imminent need to improve water management practices, without which the goal towards poverty eradication and achieving targets under the United Nations Sustainable Development Goals (SDGs) will be threatened.

Adaptation to climate change is closely linked to the water sufficiency and its role in sustainable development including usage in industries and industrial parks. Adaptation is the process of adjustment to actual or expected climate hazards and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate change and its effects (IPCC, 2014).

Extreme weather events such as floods, cyclones, droughts and heat waves will have direct impacts on the functioning of industries and industrial parks. Water plays an important role for functioning of industries and industrial parks for domestic and industrial production. Industries and industrial parks are demanding ever-greater volumes of water, while at the same time producing waste and effluents, which in many places taint and damage the quality of this precious resource on which all life depends. A combination of extreme climate events and untreated discharge of effluents can have increasingly severe impacts on the environment.

Private sector involvement as a source of funding in developing climate resilient solutions has increased in recent years. The private sector can be interpreted as an individual company or a group of companies coming together in a cooperative approach to address or implement climate resilient solutions. There are currently only a few solutions for addressing water management as climate resilient infrastructure, however there are many challenges and barriers for Small and Medium Enterprises (SMEs) or industrial parks to invest and implement these solutions.

This policy brief will address the challenges, key messages and propose policy measures to encourage private investment in water management as climate resilient infrastructure through literature survey and lessons learnt from prototypes developed and implemented in Andhra Pradesh and Telangana state of India. This policy brief will address issues related to water stress conditions (Drought and Heat Waves) and its related private sector investment.

2. Water Management as Climate Resilience Measure for Industries and Industrial Parks

Climate change will increase the urgency for better uptake and implementation of integrated water resources management, to improve water efficiency, build resilience and support adaptation (Sadoff & Muller 2009)[1].

2.1 Business-as-usual Scenario

Under a "business-as-usual" scenario of continuing demographic, economic and technological trends up to 2025, water withdrawals are expected to stabilize or decrease in 41% of world river basin areas because of the saturation of water needs and improvement in water-use efficiency (Alcamo *et al*., 2003). Research by the International Food Policy Research Institute (IFPRI), found that 4.8 billion people, more than half the world's population, will be at risk due to water stress by 2050 if status quo, business-as-usual behaviour is followed. For China, India, and many other rapidly-developing countries, water scarcity will increasingly and negatively affect growth - with 2.7 billion people living in water scarce basins in these countries alone by 2050, up from 1.4 billion today. The increase in population will drive a greater demand for food and economic development (i.e., water). Approximately half (49%) of global grain production and 45% of total GDP ($63 trillion) will be at risk due to water stress by 2050. Moreover, risk to economic growth and food supplies as a result of water scarcity is not only a reality in developing countries, but is present in many key industrialized areas and countries[2].

Industries not only consume water but also pollute it. According to the World Development Report (WDR) of 2003, in developing countries, 70 per cent of industrial wastes are dumped without treatment, thereby polluting the usable water supply[3]. Almost all users will place heavy demands on the world's water supply under the business as usual scenario. Total global water withdrawals in 2025 are projected to increase by 22 percent above 1995 withdrawals. It will also have greater impact in developing countries than in developed countries. In 1995 industries in developed countries consumed much more water than industries in the developing world. By 2025, however, developing world industrial water demand is projected to increase to 121 km^3, 7 km^3 greater than in the developed world (Rosegrant et al., 2002).

2.2 Key Challenges and Barriers in Adaptation to Climate Change (CC) in Water Management and Industries

The key barriers, issues and challenges have been divided into 5 areas, which are broadly divided into information, institutional, technical, regulatory and financial barriers.

[1] Water Management, Water Security and Climate Change Adaptation: Early Impacts and Essential Responses http://www.gwp.org/global/gwp-cacena_files/en/pdf/tec14.pdf

[2] http://growingblue.com/water-in-2050/

[3] *https://www.idfc.com*

2.2.1 Knowledge Barriers

Knowledge or information barriers cover the low awareness among various stakeholders on climate change impacts and related resilience measures.

- Information gaps: Lack of knowledge in improving climate specific information and research on industry water and wastewater management.
- High Cost Perception: Consumers often give greater weight to upfront or capital costs compared to recurring costs.
- Managing uncertainties: Anticipating a range of future climate impacts as part of infrastructure decision making.
- Due to the long-term nature of climate change, adaptation actions are not considered as priority.
- Difficulty in understanding natural variability, scientific uncertainty and local uncertainty

2.2.2 Institutional Barriers

- Limited capacities of policy makers to formulate green policies and strategies on climate resilience
- Weak policy implementation and enforcement: The government should ensure strict enforcement of policies
- In a multi-stakeholder environment, the roles and responsibilities of each stakeholder should be clearly stated.
- Formation of Special Purpose Vehicle (SPV) should not be biased or politically driven.

2.2.3 Technical (including Operation & Maintenance) Barriers

- Industries: Lack of technical skills to plan, design, install, operate and maintain clean technology / climate resilient infrastructures
- National governments: Lack of national standards and certified operators to guarantee the quality and safety of water and wastewater management
- State and national government: Land constraints, considering growth and CC issues, land for setting treatment plants are not planned for 30 - 40 years.
- Research institutions: Providing cost-effective and innovative technology for water and wastewater (especially treatment of high Total Dissolved Solids (TDS) / high Chemical Oxygen Demand (COD) effluents) is still a challenging issue.
- Responsible agencies: Planting large number of saplings, but then no or minimum maintenance.
- Low or no maintenance or cleaning of storm water drains in industrial parks.

2.2.4 Regulatory Barriers

- Historical regulatory structures and policies in both developed and developing countries often favour low water cost and other incentives to attract industries, which lead to high water demand and consumption.
- Water is still perceived as a free resource.
- The cost of treated water is very low compared to cost of treated wastewater, hence there is no direct benefit by treating wastewater.

- Wastewater disposal criteria are not uniform across all the states within the country and hence cost of treatment and reuse vary.
- Lack of regulatory mechanisms to test the new wastewater treatment technology or infrastructure.
- Delay in approval increases the gap further between grant approved by the government and the actual project cost. Presently it takes around 3 to 4 years to get approval of common effluent treatment plants (CETPs). The Government does not consider the inflation during this period while sanctioning the grant thus eroding much of the fund towards the inflated capital cost.

2.2.5 Financial Barriers

- There are limited incentives for new wastewater treatment plants, and very limited incentives for upgrading of existing infrastructure.
- Because of perceived higher technology risks and return uncertainty, lenders often perceive high risk to lend to SME clusters.
- There is no direct monetary benefit perceived by investing in water management or improving greenery / plantation by SMEs.
- Subsidised conventional fuels like coal, etc., which encourage investors to prefer coal based / fire-wood based boilers for energy intensive wastewater treatment plants (Multiple Effective Evaporator) and burning of more fossil fuel will in turn exacerbate climate change.
- Returns on investment for water and wastewater projects are very low because of weak enforcement and compliance, which can be subjected to higher uncertainty.
- CETP operators / owners are finding it difficult in some cases to charge fees from industry members owing to the fact that some of them are contributing in terms of effluent to CETP but the rest of them are running dry.
- CETP societies feel that the service tax forms a sizable portion of the O&M charges and the same should be waived off in due course of time.
- Accounting for climate change cost in terms of both water as resource and climate resilient infrastructure is challenging, because of high uncertainty in cost estimation and comparison between business-as-usual scenario and adaptation implementation.

In addition to the above and with water being a sensitive issue, there is a lot of political lobbying, which puts high pressure during decision-making. Also, water is considered as a free resource and there is need for change in the mind-set of people and industries towards water conservation.

2.3 Water as climate resilience in Intended Nationally Determined Contribution (INDC)

In November 2015, 129 INDC submitting parties (128 countries and the European Union) or a total of 197 countries involved in the 21st Conference of Parties (COP21) under the *United Nations Framework Convention on Climate Change* (UNFCCC) were surveyed with regards to integration of water in INDCs[4]. Key findings include:

[4]www.iwa-network.org/downloads/1448965142-2015%2011%2029_Review%20of%20Water%20integration%20in%20INDC_VF.pdf

- Water is one of the priority areas for adaptation components of INDCs;
- 82% of the published INDCs mention the necessity to adapt to climate change: especially African, Latin American-Caribbean and Asia-Pacific countries
- 92% of INDCs which mention adaptation include water
- Water is the first priority area noted for adaptation, followed by agriculture and health
- Four main themes are mentioned for water: Agricultural water, risk management (flood & drought), Integrated Water Resource Management (IWRM), drinking water
- Water actions are diverse in nature, with 3 priorities: Information systems (collection and transmission of data at local and national levels), institutional /regulatory measures (i.e. taking into consideration climate change issues in the National Plans for water), and infrastructure (network improvements, construction of dams, etc.).

2.4 Case Studies on Water Management in Industrial Parks

Private sector actors have been increasingly involved in the field of water management in developing countries. Nonetheless, industry contributions towards water management are very low so far.

There are good business reasons for companies to determine water-related risks. They may also show their commitment to sustainability by reducing and using recycled water embedded in their products and services. The following two cases or prototypes made an attempt to address climate resilient infrastructure through cooperative contribution from industries.

Case Study 1: Improving Water Management and Plantation in Green Industrial Park Jedcherla (Telangana, India) (*referred to as GIP Jedcherla*)

The total area of the site is 3.86 km2 (954.23 acres), with certain areas already under development by Telangana State Industrial Infrastructure Corporation (TSIIC). In terms of climate, this site is prone to high temperatures, barren lands, heat waves and drought. Hence, it is necessary to improve the recharge of groundwater and ensure water stress on industries is reduced. This is done by a combination of Plantation and Sustainable Drainage Systems (also known as Water Sensitive Urban Designs, WSUD) in the industrial park. About 25 Ha of the industrial park is under plantation, as are all areas along the roads.

Case Study 2: Improving Wastewater Management in Industrial Park, Kondapalli (Andhra Pradesh, India) (*referred to as Kondapalli CETP*)

Kondapalli is situated in the near coastal Andhra Pradesh, which is prone to heat waves and drought in the region, where temperature crosses 48^0C in the peak summer. Several industrial parks were formed in the late 90s and are now prone to extreme events of drought and heat waves. Considering the impacts of industries and the importance of water shortage in the near future, Andhra Pradesh State Industrial Infrastructure Corporation (APIIC) along with local industrial association (Kondapalli Industrial Associate - KIA) took an initiative to implement common effluent treatment plant to address the pollution and recycling of effluents. About 160 kilolitres per day (KLD) of treated wastewater is recycled water and used for industrial purposes like coolants and in industrial processes.

3. Findings and Recommendations

By far, most of the policy responses to climate change are towards mitigation. Although these initiatives may slow down climate change, they will not halt or reverse it. Because the effects of climate change are inevitable, adaptation should be addressed with the same urgency as mitigation to compensate hazards from CC. This section on findings and recommendations draws from lessons learnt from the above case studies and existing literature.

At the industrial park level, industries can come together to address adaptation issues through a cooperative approach. This is beneficial to SMEs in particular, where the capital cost of implementation and maintenance of infrastructure is high. The major advantages for considering a cooperative approach for industrial development authorities and SMEs are:

1. To achieve 'economics of scale' in water management and waste treatment, thereby reducing the cost of water infrastructure and pollution abatement for the individual factory.
2. To join forces to mobilize technical knowledge, which otherwise is limited to technical assistance and trained personnel.
3. To solve the problem of lack of space jointly as the centralized facility can be planned to ensure that adequate space is available in the common area or as common infrastructure.
4. To organize collective decision-making, water management, plantation and disposal of treated waste and sludge and to improve the recycling and reuse possibilities.

3.1 Planning and Standardisation

So far, there is no standard measure to assess climate risk and vulnerability for industrials parks and industries. The assessment tools that do exist are mostly based on past climate records and current experiences.

Case Studies 1 and 2: GIP Jedhcerla and Kondapalli CETP

Both the industrial associations have realized the issues of drought and heat waves prevalent in the region, which have enabled them to initiate water recharging and wastewater recycling concepts in the industrial parks.

There is a need for standardisation of consolidated climate risk assessment at the state level, addressing various sectors including industry. The risks of climate change should be assessed, in the same way as risks to national security or public health. The consolidated risk assessment should report to the highest level of government; not only, for example, to the environment minister or to those who are responsible for planning.

3.2 Data Management

Data management needs to consider as its starting point the fact that knowledge about specific climate change related impacts on industrial areas and even the regional impacts is not available and would differ from place to place. More regionalised information on climate hazards, risk and vulnerability assessment can help industrial parks in developing appropriate adaptation measures and solutions.

3.3 Awareness and Capacity Building

Awareness raising through participatory approaches that involve all key stakeholders like industries, Pollution Control Board, experts in climate change, etc. The awareness raising can cover developing posters and banners in local languages on water management and climate resilience. Sensitization and awareness generation of the citizens at large is also an integral step for industrial level climate resilience outreach.

Case Study 1: GIP Jedcherla

Massive awareness drives were conducted for the launch of plantation programs, where many stakeholders like industries, community, institutions, etc., participated. TSIIC provided the saplings free of cost and individual industries have taken responsibility for providing tree guard and maintenance, where the cost is shared by the government (15%) and individual industry (85 %). About 25000 saplings were planted covering 30 Hectares of the land (Block plantation) and along 40 km of the road (Avenue plantation).

Capacity building at all levels has to be taken up addressing state government officials and industrial level decision makers, community, and key stakeholders in the industrial park. Capacity building measures can be introduced by providing training on climate change adaptation to specific groups, such as developers, industries, etc. If the capacity building is associated with certified courses on climate resilience planning and linked with their promotion in jobs, then it becomes an incentive for stakeholders to take up such courses and implement such measures.

3.4 Water-Energy-Climate Nexus

Effluent treatment is an energy intensive process, especially while dealing with high TDS and high COD, which requires processes like Multiple Effective Evaporator (MEE), etc., to treat the effluents generated from industries. In such cases, there is high potential for trade-off between water and energy, thus creating adaptation and mitigation measures more complex to deal with.

Under such conditions, wastewater treatment shall install energy efficient equipment as may be certified and/or recommended by national or international standards, CETPs shall install renewable energy systems to the extent possible.

Valorisation shall be encouraged in CETPs for possible recovery of useful products or materials from the wastewaters.

3.5 Promotion of Technology

There is a need for innovative technologies in water management and treatment of effluents in the industrial parks. These include promotion of sustainable storm water drains in the industrials parks. Water sensitive urban design (WSUD)[5] or sustainable storm water drains embrace a range of measures that are designed to avoid, or at least minimise, the environmental impacts of

[5] Water Sensitive Urban Design, www.melbourne**water**.com.au/**wsud**

urbanisation in terms of the demand for water and the threat to natural water bodies from excess storm water flow and pollution. These drains will treat the storm water along the course and also will help in the recharging of ground water through pits at regular interval.

Similarly, there is a need to come up with innovative technologies for treating of effluents of the highest order especially while dealing with high COD and high TDS effluents. To address these issues, government and private sectors need to promote, test and implement innovative technologies and design processes for improving water and wastewater management.

Case Study 1: GIP Jedcherla

TSIIC initiated climate change adaptation practices by considering sustainable storm water drains known as Water Sensitive Urban Design. This concept is still under development in India, where the storm water drains are designed to recharge the groundwater by introducing a combination of plants, gravel and other natural means for treating and recharging rainwater along the course of storm water drains. This approach is different from conventional practices, which involve storm water drains constructed by concrete technology. This system is much cheaper and more sustainable than conventional systems.

In the traditional conveyance approach to storm water management, water is transferred through pipes or concrete channels. WSUD offers an alternative approach and emphasises the benefits of storm water as a resource and waterways as an environmental asset. **Through an integrated approach WSUD seeks to minimise the extent and impact of impervious surfaces and mitigate changes to natural water balance through on-site re-use of water as well as through temporary storage and treatment.**

Opportunities should be explored to undertake thematic research for developing and promoting cost-effective and micro-ecologically conducive technologies for developing climate resilient technologies that also address socio-economic, health and safety needs of the local communities. Schemes for recycling and reuse of treated waste water may also be further promoted. Efforts need to be made to introduce and implement the zero discharge concept, which would enhance recycle and reuse of effluent discharge, especially in water stressed regions.

Case Study 2: Kondapalli CETP

The project portfolio includes collection of pre-treated High TDS and Low TDS effluent from member industries, treatment of HTDS effluent and LTDS effluent to meet the discharge standards of on-land irrigation, and reuse of treated water in the member industries. Installation of Multiple Effective Evaporator (MEE) system with steam stripper, installation of Secondary Treatment (two stage Activated Sludge Process) and tertiary treatment (installation of multigrade sand filter, Activated Carbon Filter) considering energy efficient technologies.

3.6 Formation of Special Purpose Vehicle (SPV) for Infrastructure Management

A Special Purpose Vehicle (SPV) shall be set up for overseeing of the planning, development and management of common water and wastewater infrastructure. These infrastructures may be built and operated by the SPV or an operator appointed by the SPV. The SPV should be an independent but privately owned organization. The SPV will be represented by industries of the park and collectively responsible for all the activities in the industrial park. SPV can collectively contribute the component of industry contribution, while availing any grants or loans.
The board of SPV, although represented by industries, should be free from the influence of individual industry members thus minimizing hindrance to the day-to-day functioning.

Case Study 2: Kondapalli CETP

Kondapally Industries Association has promoted a Special Purpose Vehicle “Kondapally Envirotech Pvt Ltd. (KEPL)” for establishment of Common Effluent Treatment Plant (CETP). KEPL has received a government subsidy for establishment of a CETP.

3.7 Financing

Financing of climate resilient infrastructure plays an important role in successful implementation. There is a need for development of business models for promoting water and wastewater management technologies and services. But, there is also a need for improving existing policies to reduce water stress and enhance water related adaptation measures.

3.7.1 Cost of freshwater

To promote industrial development and employment generation, local and central governments provide water and energy at low cost to prospective industries in many developing countries, which has further implications on water sufficiency regionally. There is need to control or completely end these kinds of government subsidies. Instead, the government can provide incentives by developing sustainable or climate resilient industrial parks and provide necessary services to the industry at reasonable cost.

3.7.2 Water Adaptation Fund

There is an urgency to set up a 'Water Adaptation Fund' to promote water and wastewater technology up-gradation, investments in research and development, and promoting and providing incentives to entrepreneurs for promoting water and environmental sustainability. Such initiatives emphasizing the promotion of water-efficient products and processes should be widely disseminated to raise awareness among various stakeholders and enable the utilization of their provisions.

3.7.3 Grants and incentives

There are provisions of grants and incentives for implementing wastewater management in industrial parks, especially for SMEs. However, there is a need to expand incentives for water management in industrial parks. The concept of sustainable storm water systems is still in a development stage. To promote such water efficient designs, government should contribute to implementation through grants or concessional loans. In such cases, government can support early

market development through a series of direct grants for R&D, project development or industrial restructuring.

Case Study 2: Kondapalli CETP

The Government of India and the State Government of Andhra Pradesh have provided grants of up to 29% of the total capital cost of the CETP, subjected to certain conditions.

3.7.4 Tax benefits and import duties for higher technology

Another way to promote would be by providing partial or complete tax benefits to industrial parks, which promote water efficiency and wastewater recycling. This will motivate industrial parks to implement water management measures as a component of adaptation.

In addition to the tax benefits, certain water efficient and cleaner technologies may require to be imported from other countries or states, these cleaner technologies may be exempted from import duties.

3.7.5 Speedy process of approval

Grants and subsidies from the government are time-consuming processes. However, setting up and promoting efficient e-governance mechanisms for project evaluation and appraisals to avoid delays at the Ministry and its regional and subsidiary offices can be introduced. Adoption of a similar transparent accessible and time-bound IT-based consent management system may also be adopted.

3.7.6 Risk management

Early-market development instruments consist of measures to boost clean technology development and deployment through securing and boosting market demand. These can be supported through Debt-Based and Equity-Based Instruments, which specifically aim to lower the risk of lending to and investing in green investment, thereby attracting lower cost-of-capital finance from the private sector.

Debt-based instruments include:

- provision of credit lines to commercial finance institutions (CFIs) for on-lending to green investors or cooperatives;
- loan guarantees to cover a portion of the risk of non-repayment of the loan principal;
- project loan facilities to provide debt financing directly to projects where conventional CFIs are unwilling or unable to provide such financing themselves;
- soft loan programmes to provide debt capital at concessional interest rates.

Case Study 2: Kondapalli CETP

Being an association and cooperative society, banks felt it is less risky to fund such projects and KEPL was able to borrow about 30% of the total project financing through banks' lending.

3.7.7 Reducing fuel subsidy and promoting energy efficiency

Wastewater treatment requires high-energy costs. To treat up to the highest quality for recycling, wastewater needs to undergo an evaporation process, which requires boilers to transform high TDS effluent to clean water. Generally, in developing countries there is high subsidy of coal and petroleum products. These subsidies should be slowly phased out and shifted towards promoting energy efficiency and renewable energy.

3.7.8 Encouraging Private Sector or Cooperative Approach participation

It is necessary that the concept of Public Private Partnership (PPP) be implemented in principle and expeditiously. PPP enabling provisions in the existing laws and regulations should be made more interactive. Private sector participation should also be motivated in promoting PPP initiatives. The cooperative approach should be motivated in industrial parks with SMEs where the capacity for collection or pooling of funds required for infrastructure projects is lower.

Case Study 2: Kondapalli CETP

Kondapalli CETP industries (SMEs) has formed an association and raised an amount equal to 69% of the total capital cost. These SMEs have processed required government approvals, technology and implementation for CETP functioning through a cooperative approach.

3.8 Regulatory Framework

Regulatory requirements to incorporate climate risk information into policy planning and public investment plans (e.g. national irrigation policy, etc.)

- Climate-resilient and low-carbon infrastructure standards
- Protection of intellectual property rights for innovative technologies
- Need to include mandatory adaptation measures as part of environmental clearance
- Removal of trade barriers to climate technologies
- Compliance standards aligned with water allocation plans
- Water storage regulations
- Development of conflict resolution mechanisms

In order to ensure effective compliance and strict enforcement, nations should formulate comprehensive national policies, procedures (mandatory at least in key aspects), and guidelines for compliance and enforcement (including consent issuance, monitoring, inspections, and sanctions). This should be done in partnership with regional or local governments to ensure uniformity.

Case Study 1: GIP Jedcherla

GIP Jedcherla industrial parks have formed an association for implementation and maintenance of infrastructure. This association is responsible for planning and implementation of storm water drains and plantations.

3.9 Operation and Maintenance

Operation and maintenance of climate resilience infrastructure is necessary for long-term working conditions of these measures. The industrial associations or SPVs formed can work out the business models to operate and maintain water management or wastewater treatment and recycling plants.

4. Conclusion

There is a need for an integrated approach to addressing the issues related to water and wastewater management in the industries and industrial parks. A whole regulatory package should be put together by the central government as well as at the regional level to target SMEs and industrials, including a comprehensive inventory (climate hazards, exposure, risk, vulnerability, etc.), simplified monitoring procedure, climate change awareness raising, and technical and financial assistance programs.

Close cooperation with industry associations is also essential in developing user-friendly technical guidance documents and setting up economic incentive schemes, based on best practices. There is a need for shifting from just environmental compliance to climate resilient infrastructure considering environmental compliance.

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