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Primer on 07. Bye Laws for Reuse of Wastewater – Optional Reform under JNNURM

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PRIMER ON

O7. BYE LAWS FOR REUSE OF WASTEWATER
Optional Reform under JnNURM

1. The Reform

Government of India (GoI) has launched JnNURM under which 63 mission cities are being provided reform linked central assistance for financing CAPEX. State Governments will complement central assistance to the extent of 10 to 20% and Urban Local Bodies (ULBs) will contribute 10%. ULBs of Mission cities and State Governments are required to undertake mandatory and optional reforms to avail JnNURM assistance.

One of the optional reforms to be undertaken at the local body/city level is formulating "Byelaws for reuse of wastewater". This primer provides explanation and lists the essential steps in implementing this reform. In this primer, the words "water reuse", "reclaimed water", "treated wastewater" have been used interchangeably.

To meet the water demand for the growing population and to provide for protection against droughts, local governments must make the most efficient use of their water resources. Water recycling and reuse offer cost-effective and ecologically beneficial solutions. Water reuse involves using domestic wastewater from bathroom, kitchen, clothes washing and toilets a second time around, for an appropriate purpose after primary, secondary or tertiary treatment. This can be at an individual property level or at group housing level like apartment complexes or at community level.

Definition of Water Reuse

Water reuse refers to the practice of capturing and using water discharged or lost by a previous user. Water reuse reforms allow ULBs to ensure dependable and cost-effective water supply to communities in an environmentally sustainable manner.

Source: Promoting Municipal Water Reuse in Maharashtra, USAID, WENEXA II.

2. Rationale for reform

Wastewater can be put to many uses. Major applications for reuse of wastewater are:

- Watering of public parks, recreation areas, road medians, areas surrounding public buildings, large apartment complexes and condominiums
- Watering golf courses, stadia, play fields
- Usage for fire protection
- Usage for vehicle washing, servicing, laundries
- Usage for toilet and urinal flushing in commercial buildings, hospitals, industries
- For Industrial usage such as cooling, process water for textiles, paper and other chemical industries etc.
- Ornamental usage for public fountains
- Agricultural usage in the farms, orchards
- For ground water recharge
- For augmentation of potable water supplies

Water reuse reforms can be implemented for a number of beneficial purposes which include the following:

a. Improvement of service levels

Water is a limited resource and the reuse of treated wastewater can provide incremental supply for non-potable applications listed in the previous section, facilitating reduced stress on potable water supplies. In areas where water resources are stressed and have been already utilized to their maximum capacity, water reuse will ensure adequate and reliable water supply for the growing population.

b. Optimization of allocation of water assets

Water reuse promotes environmental sustainability by reducing the burden on already stressed basins and aquifers and preventing their depletion. It encourages better resource allocation by ULBs and reduces the need for augmenting supplies.

c. Resource conservation

The most important aspect of water reuse is the conservation of the precious and scarce water resources. Water reuse decreases the pollution levels in freshwater, which is essential for supporting fish, wildlife and plant life. In addition, wastewater can also be used for agricultural, commercial and industrial purposes. In addition, recycled water can be used to create or enhance wetlands and stream habitats.

d. Reduce economic and regulatory costs of sewage disposal

Water reuse results in lower volume of sewage discharge leading to reduction in environmental costs for keeping rivers and streams pollution-free.

3. Benefits from the reform

By adoption of water reuse reform, ULBs can ensure adequate and reliable water supply for growing communities and thereby improving service delivery. In addition, water reuse facilitates ULBs in efficient resource allocation by promoting drawing of water from aquifers only for potable uses and reducing the need for augmenting supplies. Also, water reuse ensures resource conservation, preservation of sensitive ecosystems and reducing pollutant loading on rivers and streams.

Benefits from the reform are given as under:

3.1. For Citizens

- Reliable local supply
- Improvement in quality of life due to adequate availability of water
- Cleaner environment through reduced pollution levels
- Resource conservation and availability of better quality of water to downstream users due to reduced pollution load on rivers

3.2. For ULBs/Parastatals

- Improved service delivery and therefore improved financial recovery
- Increased efficiency in allocation and utilisation of resources
- Improved resource conservation resulting in environmental and financial sustainability
- Freeing up of potable water resources thereby helping the demand needs of downstream users
- Saving of cost for sewage treatment and disposal

3.3. For State Governments

- Efficient allocation of resources since reuse will lead to postponement of need for augmenting supplies

4. Reform components

Table 1 – Reform Components

Component	Description
Legal and institutional	<ul style="list-style-type: none">• Prepare legal and institutional framework to allow for water reuse• Define roles and responsibilities of agencies/departments• Prepare water reuse byelaws making dual piping; dual plumbing etc mandatory in new property developments• Adopt water reuse byelaws through an ordinance or change in regulations
Operational	<ul style="list-style-type: none">• Conduct feasibility studies for identifying reuse technologies and applications• Make water reuse mandatory in new developments – all large buildings with more than 2000 sq.m. area and new layouts shall implement water reuse• Approval of plans by ULB or planning authority for new developments shall conform to water reuse regulations• Lead by example – ULBs should adopt water recycling in municipal and other government buildings• Implement monitoring requirements
Social	<ul style="list-style-type: none">• Conduct public education campaigns and awareness programs in schools, offices, community spaces

5. Steps in implementing the reform

The following broad steps should be followed for implementing water reuse reform:

5.1. Preliminary evaluation and planning

The first step involves broad based fact-finding that will enable ULBs to evaluate physical, economic, legal and institutional issues related to water reuse planning. Important questions to be addressed in this phase include the following¹:

- What is the present and projected reliability of potable water in the area?
- What local sources of wastewater might be suitable for reuse?
- What are the potential local markets for reclaimed water?
- What are the present and projected user costs for potable water in the area?
- What public health considerations are associated with reuse, and how can these considerations be addressed?
- What are the potential environmental impacts of water reuse?
- What are the institutional constraints and legal powers that may affect reuse?

5.2. Setting up legal and institutional framework

¹ Guidelines for water reuse by USEPA and USAID, September 2004

The second step in implementing a water reuse program is institutionalizing water reuse as a part of the building byelaws, regional planning and comprehensive development plans. Specific byelaws on water reuse need to be framed making it mandatory for all new developments to practice water reuse and for restricting the usage of potable water supplies for non-potable purposes by the existing users. The byelaws should make it mandatory for large properties to incorporate water reuse and water conservation in their premises. For example, for residential plots of more than 2000 sq.m, and for non-residential plots of more than one hectare in size, the following provisions should be made:

- (a) Separate conveying system for sewage and sullage to facilitate reuse of sullage water for gardening and washing purposes. This may require suitable storage facilities that are to be indicated in the building plans.
- (b) Indication of location of treatment and disposal facilities for treating wastewater
- (c) Separate plumbing system for use of wastewater in the building and to be indicated in the plumbing plans.

The byelaws, once developed as a draft, should be disseminated inviting opinion of general public, architects, developers etc. and after resolving the issues, if any, should be approved and institutionalized through an order. The print media and websites can be effective tools for disseminating the byelaws for their adoption by the users. Some of the key actions in institutionalizing the byelaws are given below:

- (a) Final design and decision on end use of a Wastewater Recycling System
- (b) Preparation of draft building byelaws to reflect the mandatory clauses of such a system
- (c) Amendment of the existing legislation to introduce the new Building Byelaws and procedures
- (d) Dissemination of the new Building Byelaws through a website
- (e) City level workshops to address the queries of general public
- (f) Start of approval as per the new Byelaws

A set of typical byelaws are listed in **Annexure I**.

5.3. Guideline Standards for Reuse of WasteWater

The byelaws could be supported by a set of standards for the reuse of wastewater, which vary with the type of application, regional context as well as with the overall risk perception. Guidelines for standards of reuse of wastewater should be set for the following categories:

- Unrestricted urban reuse
- Restricted urban reuse
- Agricultural reuse – food crops
- Agricultural reuse – non-food crops
- Restricted recreational reuse
- Unrestricted recreational reuse
- Environmental – wetlands
- Industrial Reuse
- Groundwater Recharge

The World Health Organisation has recommended guideline standards for agricultural reuse of wastewater and these are followed in many countries.

5.4. Enforcement and Monitoring Mechanism

Enforcement and monitoring is very important for enforcing the adoption of the Byelaws. The enforcing authorities can be identified and a monitoring mechanism should be instituted and periodic monitoring of the progress of water reuse in the ULBs should be undertaken. A typical enforcement mechanism for Bangalore (for promoting use of wastewater and restricting the use of potable water for non-potable purposes) instituted by Government of Karnataka is given in **Annexure II**.

5.5. Public consultation and education programs

A critical step in planning water reuse projects is to develop or reinforce strong working relationship among ULBs, water supply agency (if separate from ULB), potential reclaimed water users and civil society. These working relationships will help to develop solutions that best meet the needs of the community. A public participation process will not only aid in identifying potential consumers but also serve as a public education program. Potential users will be concerned with the quality of reclaimed water and reliability of its delivery and the constraints in using reclaimed water. There may be questions about connection costs or additional wastewater treatment costs that might affect their ability to use the product. Answers to these questions will help in removing common misconceptions linked to using reclaimed water, educate consumers on benefits of water reuse and assist in adoption of water conservation principles.

Consultation with property developers, architects, industry and chambers of commerce will enable ULBs in understanding water reuse requirements for different industrial consumers and will also aid in structuring of tariff and discounts for adopting reuse technologies. This public consultation also needs to be supported with awareness on dual piping systems, water conservation, safety issues arising from mixing or cross connecting of re-use and potable water supplies.

5.6. Decentralised and centralized reuse systems

ULBs should decide whether to promote decentralized or centralized water reuse systems or a combination of both. Centralised systems refer to traditional wastewater management systems where wastewater is collected through sewers from all over the ULB and then taken to a primary wastewater treatment plant, which then undergoes secondary and later tertiary treatment. The treated wastewater is then either discharged into the water supply source or supplied for non-potable purposes to the ULB through dual piping systems. Decentralised systems refer to localized applications where uncontaminated wastewater from bath, washbasins, clothes washing etc. is used for non-potable purposes such as for watering landscape. It can also refer to secondary and tertiary treatment facilities that serve individual homes, apartments and small communities by treating the wastewater from these areas and allowing them to be reused in the same locality for non-potable purposes such as toilet flushing, washing of floors, watering of gardens or recharging groundwater supplies through water recharge structures.

6. Measuring Achievement/Outcomes

Key outcomes of the wastewater reuse reform are:

- Improved service delivery with more reliable supply
- Water conservation
- Saving in cost of sewage treatment and disposal
- Environmental conservation such as improved water quality in streams and rivers
- Efficient resource allocation and optimization, including reduced withdrawals from streams, delayed source augmentation plans

Some of the benchmarks and indicators for evaluating water reuse reform could be as follows:

- % increase in volume of reclaimed water sold
- % saving in expenditure for sewage treatment and disposal
- % increase in availability of fresh water resources for potable use

Annexure 2 – Government Order for promoting water reuse in Bangalore

Extract of Government Order No: FEE 188 ENV 2003, Bangalore Dated 14-08-2003

In the circumstances explained in the preamble and in exercise of the powers conferred under section 5 of the Environment (Protection) Act, 1986 the Government hereby directs the Commissioner, Bangalore Mahanagara Palike (BMP) and Director, Horticulture Department, Chairman, Karnataka State Pollution Control Board, Secretary to Government, PWD and Principal Secretary, Transport Department, to take all necessary steps to ensure that only tertiary treated water is used for non-potable purposes, like all gardening including parks, resorts and golf course, washing servicing and cleaning of vehicles and all civil construction activities like building multistoried apartments, commercial complexes, housing complexes of private developers and State government and Central government, including roads and bridges in Bangalore city.

The Government further directs the respective license issuing and plan sanctioning authorities to invariably include the condition in their approvals and licenses that only tertiary treated water shall be used for non potable purposes as stated above”.

Bangalore Water Supply and Sewage Board shall not sanction potable water supply connection to all such activities as mentioned above.

In the first phase, Government directs that use of tertiary treated water should be encouraged for the following. The enforcing authority is also shown against each activity.

1.	Use of water for BMP parks	Commissioner, BMP
2.	Construction of apartments, commercial buildings, housing complexes of private developers, State government and Central Government	K.S.P.C.B
3.	Construction of roads in Bangalore city Municipalities around Bangalore, layouts of BMP, BDA, KHB, National Highways, PWD roads	KSPCB
4.	Service centers of servicing of Cars, trucks, servicing of BMTC Vehicles at bus depots.	KSPCB

Bangalore Water Supply and Sewage Board will make all arrangements including construction of filling points, installation of vending machines at sewage treatment plants for supply of tertiary treated water in multiples of thousand liters.

Bangalore Water Supply and Sewage Board will issue periodically appeals to public to conserve potable water.