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Policy framework for urban development in north east India on context of solid waste management

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ABSTRACT

As urbanization continues to take place in North East -India, the management of solid waste is becoming a major public health and environmental concern in urban areas of its many developing cities. The rapid pace of urbanization would presuppose an increase in the provision of infrastructure. But this has not been the case as many cities within north east zone are unable to provide the basic infrastructure. The problems are likely to become even more pronounced as the cities continue to grow rapidly causing a strain on municipal infrastructures like water supply, sewage and solid waste disposal causing grave public health problems. Solid waste disposal poses a greater problem because it leads to pollution of various kinds. Land pollution directly if thrown and dumped openly, water pollution if dumped in low-lying area and air pollution if burnt. To elucidate the various processes involved in producing the patterns of socio-economic and environmental health in a city, one needs to concentrate both on the natual as well as built up environment. The environment influences many aspects of human beings, and many diseases can be initiated sustained or exacerbated by environmental factors. Therefore a study was carried out for north east India to find out the different policies that should be regulated and maintained strictly and also understand the challenges and responsibility faced both by the community and the management. In this research paper an attempt has been made to describe the policies those have been issued by the central and state government authorities. Every individual should maintain it strictly to avoid affection on human health especially because of municipal /solid waste and water contamination,

Key Words: urbanization, pollution, disease, sewage and solid waste, water contamination

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INTRODUCTION

Urbanization is an index of transformation from traditional rural economic to modern industrial one. It is progressive concentration (Davis, 1965) of population in rural unit. Quantification of urbanization is very difficult. It is a long terms process. Kingsley Davis has explained urbanization as process (Davis, 1962) of switch from spread out pattern of human settlement to one of concentration in urban centres. Therefore, "Cities and towns have been engines of growth and incubators of civilization and have facilitated the evolution of knowledge, culture and tradition as well as industry and commerce. Urban settlements, properly planned and managed, hold the promise for human development and the protection of the world's natural resources through their ability to support large numbers of people while limiting their impact on the natural environment."

To harness the full potential of our north-east urban areas and to address the needs of our growing population, the different policies under management of solid wastes should be regulated with the need under national guidelines for the development of our north east India's urban areas towards the goal of sustainable human settlements. Government accepts that solid waste problem and its management is one of the major issues now a day for the environment.

Different wastes have been reported in regular basis in variable percentages in both selected urban and rural areas. Street sweeping, grass cutting, drain and public toilet cleaning, removal of dead bodies, garden wastes and bulky wastes also contribute to solid waste those have been mainly observed in urban areas. Components such as paper, plastic, vegetables, wood etc were mostly found in rural areas than urban ones. However different types of wastes found in NE regions that include domestic, industrial, institutional, street wastes which have been again found to be more dominant in urban areas. Different wastages dumped nearby localities or burnt in other places include paper, glass, metals, textile, plastics, wood, food wastes etc.

This study observed that solid wastages are still a major problem in our urban as well as rural areas of north-east India. However, its percentages are decline from earlier years due to its proper managements. Therefore a study was carried out for north east India to find out the different policies that should be regulated and maintained strictly and also understand the challenges and responsibility faced both by the community and the management. In this study , an attempt has been made to describe the policies those have been issued by the central and state government authorities. The main purpose of the present study is to describe the special roles of the management of solid waste.

Objective:

The main objective of the study is given below:

a. To examine policy framework for Urban Development in North East India on context of solid waste management

METHODOLOGY

Methodology is an important part of social research. The present study is based on secondary sources. For this work we have studied about ten (10) different related research studies and collected other official data from the government authorities. All are the secondary have been collected from books, journals, different internet sources and the other available related existing literatures. All collected data and gathered information are presented in generalized with the help of descriptive research methodology.

RESULTS & DISCUSSION

In accordance with the competencies defined in the Constitution, National Government is responsible for broad policy formulation to set national standards and the funding of various programmes, such as Below Poverty Line (BPL) housing and sanitation facility, Central Rural Sanitation Programme (CRSP), National Urban Sanitation Policy (NUSP), Right to Information Act (RTI), National Water Policy 2012 (Draft), Indira Awas Yojana (IAY), Jawaharlal Nehru National Urban Renewal Mission (JNNURM), Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), National Rural Health Mission (NRHM), Nirmal Bharat Abhiyan (NBA)/Total Sanitation Campaign (TSC), Nirmal Gram Puraskar (NGP), the Municipal Infrastructure Programme and the Urban Transportation Programmes.

Ministry of Environment and Forests drafted the municipal solid wastes (management and handling) rules, 1999 that were published under the notification of the Government of India of the Ministry of Environment and Forests in 1999. Later on these rules may be called the Municipal Solid Wastes (Management & Handling) Policy, 2000. Again these rules shall also apply to every municipal authority responsible for collection, segregation, storage, transportation, processing and disposal of municipal solid wastes in their work areas.

As per Gogoi . L (2013) worked on municipal solid waste disposal on Guwahati city Assam; she has explained that due to rapid population growth within a short period of time, the city faces many problems. One of the major problems of the city is improper disposal of municipal solid waste which has become an acute problem due to enhanced economic activities and rapid urbanization.

SOME STANDARD DEFINITIONS UNDER MSW

Here we have mentioned some

standard keywords and their definitions under management of solid wastes used by government authorities.

1. "**authorization**" means the consent given by the Board or Committee to the "operator of a facility" ;
2. "**biodegradable substance**" means a substance that can be degraded by micro-organisms;
3. "**composting**" means a controlled process involving microbial decomposition of organic matter;
4. "**collection**" means lifting and removal of solid wastes from collection points or any other location ;
5. "**disposal**" means final disposal of municipal solid wastes in terms of the specified measures to prevent contamination of ground-water, surface water and ambient air quality ;
6. "**demolition and construction waste**" means wastes from building materials debris and rubble resulting from construction, re-modeling, repair and demolition operation ;
7. "**generator of wastes**" means persons or establishment generating municipal solid wastes ;
8. "**land filling**" means disposal of residual solid wastes on land in a facility designed with protective measures against pollution of ground water, surface water and air fugitive dust, wind blow litter, bad odour, fire hazard, bird menace, pests or rodents, greenhouse gas emission, slope instability and erosion ;
9. "**municipal authority**" means Municipal Corporation, Municipality, Nagar Palika, Nagar Nigam, Nagar Panchayat, Municipal Council including notified area committee (NAC) or any other local body constituted under the relevant statutes and, where the management and handling of municipal solid waste is entrusted to such agency ;
10. "**municipal solid waste**" includes commercial and residential wastes generated in a municipal or notified areas in either solid or semi-solid form excluding industrial hazardous wastes but including treated bio-medical wastes;
11. "**operator of a facility**" means a person who owns or operates a facility for collection, segregation, storage, transportation, processing and disposal of municipal solid wastes and also includes any other agency appointed as such by the municipal authority for the management and handling of municipal solid wastes in the respective areas;
12. "**processing**" means the process by which solid wastes are transformed into new recycled products;
13. "**recycling**" means the process of transforming segregated solid wastes into raw materials for producing new products, which may or may not be similar to the original products;
14. "**Policy**" means a policy appended to these rules;
15. "**segregation**" means to separate the

municipal solid wastes into the groups of organic, inorganic, recyclables and hazardous wastes;

16. "**State Board or the Committee**" means the State Pollution Control Board of a State, or as the case may be, the Pollution Control Committee of a Union Territory;
17. "**storage**" means the temporary containment of municipal solid wastes in a manner so as to prevent littering, attraction to vectors, stray animals and excessive foul odor;
18. "**transportation**" means conveyance of municipal solid wastes from place to place hygienically through specially designed transport system so as to prevent foul odor, littering, unsightly conditions and accessibility to vectors;

MANAGEMENT OF MUNICIPAL SOLID WASTE (MSW)

Municipal solid waste concept is defined to include refuse from households, non-hazardous solid waste from industrial, commercial and institutional establishments (including hospitals), market waste, yard waste and street sweepings. Semisolid wastes such as sludge and night soil are considered to be the responsibility of liquid waste management systems.

9. The waste processing and disposal facilities to be set up by the municipal authority on their own or through an operator of facility shall meet the specification and standards as specified.
10. Any municipal solid waste generates in a city or a town, shall be managed and handled in accordance with the compliance criteria and the procedure laid down.

A) **Policy provision of collection of municipal solid wastes:**

All municipal solid wastes can be categorized into two main segments. First one is biodegradable in nature and second segment is non biodegradable in nature. Background of generations different types of municipal solid wastes are like house hold, industrial area, slaughter houses, bio-medical wastes and horticultural and construction and many more. But littering of municipal solid waste shall be prohibited in cities, towns and in urban areas notified by the State Governments. To prohibit littering and facilitate compliance, the following steps shall be taken by the municipal authority as per draft notification for Municipal Waste (Management & Handling) Rules, 1999 vide notification No SO 783(E) dated 27th September, 1999 covering various aspects of SWM.

Different collection methods for picking up solid wastes:

1. Organizing door to door collection of wastes
2. Proving central dustbin or bin in main area.
3. Collection on regular pre-informed timings and
4. Scheduling by using bell ringing of musical vehicle (without exceeding permissible noise levels);

Again different compliance criteria should be noted according to polices as mentioned under governments. Few of them we have mentioned below:

a. Bio-medical wastes and industrial wastes shall not be mixed with municipal solid wastes
b. During transportation, hand-driven containerized carts or other small vehicles, with full covered to wastes.
c. Waste (garbage, dry leaves) shall not be burnt in any means ;
d. Stray animals shall not be allowed to move
e. The municipal authority shall notify waste collection policy and the likely to be adopted for public benefit in a city or town.
f. It shall be the responsibility of generator of wastes to avoid littering and ensure delivery of wastes in accordance with the collection and segregation system to be notified by the municipal authority

B. Policy provision of segregation of municipal solid wastes:

In order to encourage the citizens, municipal authority shall organize awareness programmes for segregation of wastes and shall promote recycling or reuse of segregation materials. The municipal authority shall undertake phased programme to ensure community participation in waste segregation. For this purpose, the municipal authorities with respective local resident welfare associations and nongovernmental organizations shall arrange regular meetings at quarterly intervals.

C. Policy provision for Storage of municipal solid wastes:

Municipal authorities shall establish and maintain store facilities in such a manner, as they do not create unhygienic and insanitary conditions around it. Following criteria shall be taken into account while establishing and maintaining storage facilities, namely;

(i) Storage facilities shall be created and established by taking into account quantities of waste generation a given area and the population densities. A storage facility shall be placed which must be accessible to users;
(ii) Storage facilities to be set up by municipal authorities or any other agency shall be so designed that wastes stored are not exposed to open atmosphere and shall be aesthetically acceptable and user-friendly;
(iii) Storage facilities or 'bins' shall have 'easy to operate' design for handling, transfer and transportation of waste. Bins for storage of bio-degradable wastes shall painted green, those for storage of recycle wastes shall be painted black;
(iv) Manual handling of waste shall be prohibited. If unavoidable due to constraints, manual handling shall be carried out under proper precaution with due care for safety of workers.

D. Policy provision for Transportation of municipal solid wastes:

Vehicles used for transportation of wastes shall be covered. Waste should not be visible to public, nor exposed to open environment preventing their scattering. The following criteria shall be met, namely:

(i) The storage facilities set up by municipal authorities shall be daily attended for clearing of wastes. The bins or containers wherever placed shall be cleaned before they start overflowing;

(ii) Transportation vehicles shall be so designed that multiple handling of wastes, prior to final disposal, is avoided.

E. Policy provision for Processing of municipal solid wastes:

Municipal authorities shall adopt suitable technology or combination of such technologies to make use of Wastes so as to minimize burden on landfill. Following criteria shall be adopted, namely;

(i) The biodegradable wastes shall be processed by composting, vermin composting, anaerobic digestion or stabilization of wastes. It shall be ensured that compost or any other end product shall comply with standards as specified.

(ii) Mixed waste containing recoverable resources shall follow the route of recycling. Incineration with or without energy recovery including pelletisation can also be used for processing wastes in specific cases. Municipal authority or the operator of a facility wishing to use other state-of-the-art technologies shall approach the Central Pollution Control Board to get the standards laid down before applying for grant of authorization.

F. Policy provision for Disposal of Municipal Solid Waste:

Of all functional elements involved in Solid waste management, Disposal is the most important element as it includes planning, administrative set up, finance, technology support & their interdisciplinary relationships. The crucial aspect of this stage is the selection of proper disposal technology. For disposal of solid waste commonly used methods are open dumps, landfills, sanitary landfills, and incineration plants. One of the important methods of waste treatment is composting. Selection of proper disposal method is necessary & primarily it depends on the 'quantity of MSW generated & type of waste to be disposed'.

i) **Open dumps :**

The cheapest and the oldest easy method of MSW disposal is 'open dumping' where the waste is dumped in low lying areas on the city outskirts and leveled by bull - dozers from time to time. Open dumping is not a scientific way of waste disposal. Open dumps refer an uncovered site used for disposal of waste without environmental controls. The waste is untreated, uncovered, and not segregated. A

WHO Expert Committee (1967) condemned dumping as "a most unsanitary method that creates public health hazards, a nuisance, and severe pollution of the environment.

ii) **Land filling:**

It shall be restricted to non-biodegradable, inter waste and other waste that are not suitable either for recycling or for biological processing. Land filling shall also be carried out for residues of waste processing facilities as well as pre-processing rejects from waste processing facilities. Land filling of mixed waste shall be avoided unless the same is found unsuitable for waste processing. Under unavoidable circumstances or till installation of alternate facilities, land-filling shall be done following proper norms. Landfill sites shall meet the specification as per government rules.

POLICY PROVISIONS OF SPECIFICATIONS FOR LANDFILL SITE UNDER MSW

A) SITE SELECTION

9. In areas falling under the jurisdiction of 'Development Authorities', it shall be the responsibility of such Development Authorities to identify the landfill sites and hand over the side to the concerned municipal authority for development, operation and maintenance. Elsewhere, this responsibility shall lie with the concerned authority.
2. Selection of landfill sites shall be based on examination of environmental issues. The Department of Urban Development of the State or the Union territory shall co-ordinate with the concern organization for obtaining the necessary approvals and clearance.
3. The landfill site shall be planned and designed with proper documentation of a phased construction plan as well as a closure plan.
4. The landfill site shall be large enough to last to 20-25 years.
5. The landfill site shall be away from habitation clusters, forest areas, water bodies, monuments, National Parks, Wetland and places of important culture, historical or religious interest. A buffer zone of no-development shall be maintained around landfill site and shall be incorporated in the Town Planning Department's land-use plans.

B) FACILITIES OF THE SITE

Landfill site shall be fenced or hedged and provided with proper gate to monitor incoming vehicles or other modes of transportation.

1. The landfill site shall be well protected to prevent entry of unauthorization persons and stray animals.
2. Approach and other internal roads for free movement of vehicles and other machinery shall exist at the landfill site.

3. The landfill site shall have wastes inspection facility for monitor wastes brought in for landfill, office facility for record keeping and shelter for keeping equipment and machinery including pollution monitoring equipments.
4. Provisions like weighbridge to measure the quantity of waste brought at landfill site, fire protection equipment and other facilities as may be required shall be provided.
5. Utilities such as drinking water (preferably bathing facilities for workers) and lighting arrangement for easy landfill operations when carried out in night hours shall be provided.
6. Safety provisions including health inspections of workers at landfill site shall be periodically made.

C) LAND FILLING MONITORING

1. Wastes subjected to land filling shall be compact in thin layers using landfill compactors to achieve high density of the wastes. In high rainfall areas where heavy compactors cannot be used, alternative measures shall be adopted.
2. Wastes shall be covered immediately or at the end of each working day with minimum 10 cm of soil, inert debris or construction material till such time waste processing facilities for composting or recycling or energy recovery are set up as per Policy I.
3. Prior to the commencement of monsoon season, an intermediate cover of 40-65 cm thickness of soil shall be placed on the landfill with proper compaction and grading to prevent infiltration during monsoon. Proper draining barms shall be constructed to divert run-off away from the active cell of the landfill.
4. After completion of landfill, a final cover shall be designed to minimize infiltration and erosion. The final cover shall be meet the following specifications, namely;
   a) The final cover shall be barrier, soil layer comprising 60 cm of clay or amended soil with permeability coefficient less that $1x10^{-7}$ cm/sec.
   b) On top of the barrier soil layer, there shall be a drainage layer of 15 cm.
   c) On top of the drainage layer, there shall be a vegetative layer of 45 cm to support natural plant growth and to minimize erosion.

D) POLLUTION PREVENTION

In order to prevent pollution problems from landfill operations, the following provisions shall be made, namely:--

a) Diversion of storm water drains to minimized leachate generation and prevent pollution of surface water and also for avoiding flooding and creation of marshy conditions;

b) Construction of a non-permeable living system at the base and walls of waste disposal area. For landfill receiving residues of waste processing facilities or mixed waste or waste having contamination of hazardous materials (such as aerosols, bleaches, polishes, batteries, waste oils, paint products and pesticides) minimum liner specifications shall be a composite barrier having 1.5 mm high density polyethylene (HDPE) geomembane, or equivalent, overlying 90 cm of soil (clay or amended soil) having permeability coefficient not greater than $1x10^{-7}$ cm/sec. The highest level of water table shall be at least two matter below the base of clay or amended soil barrier layer;

c) Provisions for management of leachate collection and treatment shall be made. The treated leachates shall meet the standards specified in Policy – IV;

d) Prevention of run-off from landfill area entering any stream, river, lack or pond.

E) WATER QUALITY MONITORING

Before establishing any landfill site, baseline data of ground water quality in the area shall be collected and kept in record for future reference. The ground water quality within 50 meters of the periphery of landfill site shall be periodically monitored to ensure that the ground water is not contaminated beyond acceptable limit as decided by the Ground Water Board or the State Board or the Committee. Such monitoring shall be carried out to cover different seasons in a year that is summer, monsoon and post-monsoon period.

F) AMBIENT AIR QUALITY MONITORING

3. Installation of landfill gas control system including gas collection system shall be made at landfill site to minimize odor generation, prevent off-site migration of gases and to protect vegetation planted on the rehabilitated landfill surface.
4. The concentration of methane gas generated at landfill site shall not exceed 25 percent of the lower explosive limit (LEL).

G) CLOSURE OF LANDFILL SITE AND POST CARE

1. The post-closure care of landfill site shall be conducted for at least fifteen years and long term monitoring or care plan shall consist of the following, namely:-
   (a) maintaining the integrity and effectiveness of final cover, making repairs and preventing run-on and run-off from eroding or otherwise damaging the final cover;
   (b) Monitoring leach ate collection system in accordance with the requirement;
   (c) Monitoring of groundwater in

accordance with requirements and maintaining groundwater quality;

(d) Maintaining and operating the landfill gas collection system to meet the standards

2. Use of closed landfill sites after fifteen years of post-closure monitoring can be considered for human settlement or otherwise only after ensuring that gaseous and leachate analysis comply with the specified standards.

H) Special Provisions for Hilly Areas:

Most of the capitals of North-east – India states are covered by hilly areas. So, special attention should be applied for management of solid wastes. Cities and towns located on hills shall have location-specific methods evolved for final disposal of solid wastes by the municipal authority with approval of the concerned State Board or the Committee. The municipal authority shall set up processing facilities for the utilization of biodegradable organic wastes. The inert and non-biodegradable waste shall be used for building roads or filling up appropriate areas on hills. Because of constraints in finding adequate land in hilly areas, wastes not suitable for road lying or filling up shall be disposed of in special designed landfills.

RESPONSIBILITY OF GOVERNMENT AUTHORITIES MUNICIPAL AUTHORITY

Every municipal authority has to maintain its responsibility towards the cleanliness of the respective areas environment.

3. Every municipal authority shall, within the territorial area of the municipality, be responsible for the implementation of the provisions of these rules and for any infrastructure development for collection, storage, segregation, transportation, processing and disposal of municipal solid wastes.
4. The municipal authority or an operator of a facility shall make an application in prescribed Form for grant of authorization for setting up waste processing and disposal facility including landfills from the State Board or the Committee in order to comply with the implementation programme laid down.
5. The municipal authority shall comply with these rules as per the implementation policy laid down.
6. The municipal authority shall furnish its annual report in prescribed format-
   a) To the Secretary-in charge of the Department of Urban Development of the concern State or as the case may be of the Union Territory, in case of a metropolitan city; or
   (b) To the District Magistrate or the Deputy Commissioner concerned in case of all other towns and cities, with a copy to the State Board or the Committee on or before the 30th day of June every year.

Responsibility of the State Government Administrations:

1. The Secretary-in charge of the Department of Urban Development of the concerned State or the Union Territory, as the case may be, shall have the overall responsibility for the enforcement of the provisions of these rules in the metropolitan cities.
2. The District Magistrate or the Deputy Commissioner of the concerned district shall have the overall responsibility for the enforcement of the provisions of these rules within the territorial limits of their jurisdiction.

Responsibility of Central Pollution Control Board, State Board or the Committees:

1. The State Board or the Committee shall monitor the compliance of the standards regarding ground water, ambient air, leach ate quality and the compost quality including incineration standards as specified.
2. The State Board or the Committee, after the receipt of application from the municipal authority or the operator of a facility in prescribed Form, for grant of authorization for setting up waste processing and disposal facility including landfills, shall examine the proposal taking into consideration the views of other agencies like the State Urban Development Department, the town and Country Planning Department, Air Port or Air Base Authority, the Ground Water board or any such other agency prior to issuing the authorization.
3. The State Board or the Committee shall issue the authorization in prescribed Form to the municipal authority or an operator of a facility within forty-five days stipulating compliance criteria and standards as specified including such other conditions, as may be necessary.
4. The authorization shall be valid for a given period and after the validity is over, a fresh authorization shall be required.
5. The Central Pollution Control Board shall co-ordinate with the State Boards and the Committees with particular reference to implementation and review of standards and guidelines and compilation of monitoring data.

MAJOR OBSERVATIONS

Content analysis and general observation method has been used for this study.

1) State-wise response of local bodies for seeking authorizations from State Pollution Control Boards and Pollution Control Committees varies from State to State
2) "Setting up of Waste Processing Facilities" State level policies have been formulated for setting up of

compost plants.

3) Regarding waste-to-energy projects has been found under construction in north-east ,India
4) Regional/common landfill facilities are under construction at several locations in north-east, India.
5) Overall Implementation Status Unless, Guiding Groups/Cells are set-up at Central, State and District Level to assist local bodies in organizing themselves to comply with the Rules, it will be difficult to achieve satisfactory compliance. There is need to develop good and adequate private entrepreneurship to participate in waste management to cover the country.

CONCLUSION

From the present study it has been found that although North Eastern Region is a small part of the country, a great variation of urban growth and percent of urban population is seen from the reviews of different reports and other relevant sources. It contributed only 2.5 percent to the total population of the India as per census 2011. In regard to both decadal growth rate and average annual exponential growth rate of urban population recorded all time high in NE region as compared to the other regions. The percentage of urban population to the total population is found increasing in NE region over the census year, but still low than the country figures. It can be concluded that the overall process of urbanization in agro based NE is very slow basically due to its location and infrastructural problems. Development of secondary sectors also not up to the mark in this region is resulted a very dependence on agriculture sector. From the mentioned policies of the present study, the following points can be suggesed. Policy should relate to proper urban planning where city planning will consist of operation, developmental of restorative planning. Operational planning should take care of improvement of urban infrastructure, e.g. roads, traffic, transport etc. developmental planning especially urban housing and environmental sanitation should emphasize on development of newly annexed urban areas. Various urban renewal processes can be used.

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