Preface

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In the wider domain of "Environment", urban issues occupy a major and important role. Urban areas are the epicenters of development and Environment and development are intertwined. All development activities eventually lead to some form of environmental imbalance. Due to unsustainable development patterns of urban centers in the developing world these imbalances are increasingly prominent and cause public concern. As the "Urban Development" in general spans over a wider domain of sectors viz. transportation, solid waste, industries, drinking water sector, power supply, and so on issues in urban environmental management essentially covers all the above sectors with additional emphasis on advanced tools and innovative approaches to improved management as they are going to play a key role in sustainability in Urban Environmental Management.

The contributions brought together in this special issue of IJEP on *Issues in Urban Environmental Management* are all focused around this theme of achieving improved Environmental Management in growing urban centers. This special issue covers key urban sectors viz. Urban Transportation, Solid Waste Management, Industrial Pollution Control, Power Generation and their impacts in various domains of Environment.

Early notion of urban environmental concerns has started with industrial pollution. Thus this special issue also starts with an article on removal of anionic surfactant from wastewater. The opening article by *Anjali Pal et al.,* "Sorption of anionic surfactant on fix bed of rubber granules", examines and assesses the performance of a fixed bed adsorber column for the removal of anionic surfactant from aquatic environment. Synthetic detergents are the major source of anionic surfactants like sodium dodecyl sulfate. Presence of these surfactants is increasing in domestic wastewater and removal of such surfactant demands a special treatment. This paper, in an attempt to develop low cost treatment process, uses waste tyre rubber granules as an adsorbent to remove sodium dodecyl sulfate, an anionic surfactant. Authors attempt to evaluate the essential FBR column design parameters using the column breakthrough data at different bed depths. An efficiency of ~90-97% was reported for a column of waste tyre rubber granules in removing sodium dodecyl sulfate. This paper presents a successful demonstration of designing a low cost treatment system for the removal of sodium dodecyl sulfate from domestic wastewater.

Gupta et al., in their paper "Air pollution potential indices in a coastal region in India" attempts to assess the air quality in the coastal region of India by means of an air quality index. With multiple pollutants coming into the atmosphere from various polluting sources it becomes increasingly difficult to measure the extent of total pollution. Varying atmospheric conditions make it much more complex as the pollutant concentrations keep

changing due to dispersion and dilution. Therefore, certain air quality indices are used to measure the extent of pollution. Higher the index the better is the dilution. Such indices are computed based on the vertical and horizontal extent of mixing of the pollutants in the atmosphere. Meteorological data is used to determine diurnal, monthly and seasonal variations in temperature, wind speed, mixing height, ventilation coefficient and air pollution potential index to assess the air quality around Jawaharlal Nehru Port Area in New Bombay, India. By analyzing the index authors demonstrates that the coastal regions are in general favourable for pollutant dispersion and Air Pollution Potential Indices (APPI) can be used as the indicators for regional environmental planning.

In similar efforts to develop indicators to monitor the air quality, *Sharma et al.,* in their paper "Studies on Neural Network Based Air Quality Predictors" tries to apply most advanced concept of neural networks to the Environmental Management. Availability of air quality data is very limited and in their work, authors try for the neural network based air quality predictors, which usually works work with limited number of data sets and are robust enough to handle data with noise and errors. A number of available variations of neural network models such as Recurrent Network Model (RNM), Change Point Detection Model with RNM (CPDM), Sequential Network Construction Model (SNCM), Self Organizing Feature Model (SOFM), Moving Window Model (MWM), are implemented using MATLAB software for predicting air quality. Developed models were run to simulate and forecast based on the annual average data for 15 years from 1985 to 1999 for seven parameters viz. VOC, NO_X, CO, SO_2, PM10, PM2.5 and NH_3 for one county of California, USA. In an exercise to predict six years of data by fitting the models with first nine years of data they could predict air quality patterns with modest accuracy. SOFM model was found performing extremely well in comparison to other models for predicting long term (annual) data.

Solid Waste Management has been growing as one of the serious problems of mega urban centers in Developing countries. Garbage filled streets are the most common sites in mega metros like Mumbai and Calcutta in India. Most common method of waste disposal – Landfills doesn't exist in India but only "open dumps", leading to tremendous adverse impact on different spheres of Environment. Unlined open dumps result in leachate contaminating adjacent soils and water sources. This not only degrades environment but also impacts the human health. In this context, *Kumar and Alappat,* in a study at one of the landfills in New Delhi, India to ascertain composition of leachate, and its effect to the ground water concludes that the leachate composition varies considerably with the age of deposition of the waste. Authors recommend different methods for the treatment of leachate from different parts of the landfill, if collected separately. They suggest a liner as the leachate was found rich in organic and inorganic constituents including heavy metals. They further suggest that immediate remedial measures are warranted at places where bore well are used to draw drinking waters in the vicinity of landfills. This paper presents one of the most common problems that the suburbs of Indian metro cities face.

The next three papers deal with the air pollution and policy issues. Air pollution in urban centers, as it comes from multiple sources and effects different part of the society, takes a

special place in urban environmental management. Air pollution has two dimensions of "local" and "global". Almost all sectors of development involve some kind of air pollution and power sector is one of the major contributors of air pollution. Various power sector policies are very well influenced by their air quality impacts. In such efforts *Shrestha and shrestha* in their paper "Environmental implications of electricity purchase from independent power producers: A case of Thailand" tries to analyzes the effect of electricity purchase from independent power producers (IPPs) on the environment in the case of Thailand. Environmental implication is evaluated in terms of the net change in emission of air-pollutants (i.e., CO_2, SO_2 and NO_x) with electricity purchase from IPPs by a utility. They demonstrate that electricity purchase from a non-dispatchable IPP plant based on coal fired generation increases the net emission compared to that without the purchase from IPPs. Authors further demonstrate that the lower plant factor of the IPP plant increases the emission of air-pollutants. With non-dispatchable IPP plants, the total emission of air-pollutants increases, while with dispatchable IPP plants the total emission decreases.

Air pollution has different dimensions viz. local, regional and global. Policies targeting one domain show spill over effect on the other domains. As transport sector is one of the major contributors of green house gas (GHG) to the atmosphere, increased efforts are taking place to check GHG emissions from transport sector. As transportation is a basic infrastructure for the development process, international funding is essential in developing countries. With increased involvement of international community in development of transport infrastructure, GHG mitigation efforts also increased. These GHG mitigation efforts show spillover effects on the emission of local pollutants. Thus, it is essential to study those spillover effects to get the complete assessment of GHG mitigation strategies. In such efforts, *Yedla et al.,* assesses the impact of CO_2 emission control strategies on the emission of local pollutants in Delhi and Mumbai. CO_2 mitigation was found influencing the dynamics of local pollutants considerably both in Delhi and Mumbai. In Delhi, TSP and SOx reduction levels against CO_2 mitigation target were found to be significant. In Mumbai, percentage reduction in local pollution (TSP in particular) is higher than the targeted CO_2 reduction. Local pollutants other than TSP and SOx shows increasing trend against the CO_2 mitigation strategies in Delhi. In case of Mumbai, all non-target pollutants showed falling trend against the CO_2 mitigation strategies though insignificantly for pollutants other than TSP and SOx. It is indeed interesting to see the improvement in local pollutants against the GHG mitigation efforts. This essentially enhances the effectiveness of such efforts to control the global problem of Climate Change.

With GHG mitigation efforts showing spillover benefits on the emission of local pollutants, achieving sustainable urban transportation is one of those visible challenges in urban environmental management. To achieve sustainability, the alternatives chosen to cater the needs of increasing travel demands need to be energy efficient, less polluting and cost effective. Further these options need to generate less resistance for their adaptation. In such efforts to identify alternative transportation modes in Beijing, China *Songli and Jiang,* in their paper "Analysis of technical options for mitigation of CO_2 emission from urban transport system: A case study of Beijing city" explains that the fuel

demand in Beijing urban passenger transport system increases rapidly in the future, along with travel demand and vehicle stock. For CO_2 mitigation targets, diesel vehicles show both reduction potential and cost-effectiveness, followed by MRTS. While ranking various barrier to the adaptation of these potential alternatives, authors found that financial incentive, public awareness, lack of infrastructure, high initial cost and institutional/administrative barrier, are in their descending order of importance. Lack of financial incentive plays an important role in adoption of new technology options.

Post Rio-era emphasized the importance of incorporating environmental economics in decision making and policy development resulting in research studies on valuation of environmental goods and even environmental degradation. Putting monitory value to the environmental loss creates new avenues for the policy makers to reconsider and correct their policy making process and created more opportunity for the improvement of urban environment. As an effort to complement this fact, *Parikh et al.,* presents valuation of air pollution with the time series data for the suburb of Mumbai called Chembur and cross sectional data of several wards. By valuing mortality and morbidity from air pollution using the above data, it is shown that the pollution in Mumbai can lead to high health costs and affect especially children and senior citizens. In general the average cost amounts to 0.26% of income due to highly subsidized treatment and poverty. However, 5% of patients who suffer severe attacks may pay as much as 19% of their income. Children and senior citizens are found affected the most. This kind of valuation creates the necessary awareness among the policy makers to handle the air pollution in a better way.

In similar efforts to apply economic tools to improve environmental management, *Yedla and Kansal,* in their paper "Economic insight to municipal solid waste management in Mumbai: A critical analysis" argues that the conventional valuation of municipal solid waste management, which doesn't consider certain implicit costs and benefits leads an under estimate the unit cost of disposal. In a comprehensive cost benefit analysis (CBA) carried out for the present system of MSW management in Mumbai with due consideration to implicit / hidden costs and benefits, authors found a difference of $6 per every ton of waste disposal from the conventional valuation of the system. This could show considerable difference in policy development at macro (municipality) level. They further argue that private sector participation is essential to achieve sustainable waste management. With the increasing demand for improved waste management, private sector participation is essential and Pigovian tax (green or waste tax) is a necessary tool to make the private sector participation in solid waste management a success.

Similar to the Environmental Kuznet curves approach explaining the relation between the development and environment, *Bai and Imura* tries to apply a macro-environmental evolution concept to explain the pattern of environmental changes over time and against the economic development. In their paper "Process and Mechanism of Urban Environmental Change: An Evolutionary View" *Bai and Imura* discusses on how an evolutionary viewpoint can contribute to the understanding of processes and mechanisms of urban environmental change. They identified urban environmental evolution concept in to four major components: a) Cities can be viewed as complex systems that are subject

to constant change, which constitutes a dynamic evolutionary process; b) Urban environmental profiles of cities are diverse, but there are certain commonalties in the longitudinal dynamics among different cities; c) Nevertheless, there is a strong non-linearity in the trajectories of the environmental evolution of cities, rather than there being a fixed common pattern; d) The trajectory is shaped by a unique combination of endogenous and exogenous forces, reflecting both the outer pressures and the responses within the system. The evolutionary perspective has important policy implications by emphasizing the possibility for cities in developing countries to follow a more environmentally sound pathway of sustainable development.

These contributions are quite diverse in character, yet they all serve to bring together the multi-dimensionality of urban environmental management. It involves many sectors and so the approaches. In the present day context of sustainable development, efforts are needed from all sectors and domain of experts to achieve better/improved urban environment. Achieving sustainability in transportation needs a wide range of efforts starting from micro-approach like developing a low cost treatment for the removal of a particular pollutant to a macro-approach like environmental evolution concept. This special issue with an indicative paper from each one of the sectors involved viz. wastewater treatment, air quality indices, application of advanced tools to environmental problems, measures to control solid waste generated problems, impact of power sector policies on urban air quality, impact of global environmental strategies on urban air quality, application of economic tools to improve urban environment and macro approach of environmental evolution to provide inputs to the policy makers provides a perfect picture of issues in urban environmental management.