

ENVIRONMENT

STATUS OF BRIHANMUMBAI

MUNICIPAL CORPORATION
OF GREATER MUMBAI



2015-16



**MUNICIPAL CORPORATION
OF GREATER MUMBAI**



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**STATUS OF BRIHANMUMBAI
2015 - 2016**



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Belgaum Karwar Sahid Smurti Udyan



Mrunaltai Gore Flyover bridge, Goregaon





- मन्तव्य -

‘पर्यावरण’ हा आपल्या सगळ्यांशीच थेटपणे संबंध असणारा जिवाळ्याचा आणि संवेदनशील विषय आहे. मुंबईकरांना नागरी सेवा-सुविधा देण्यासाठी कटीबद्ध असणाऱ्या बृहन्मुंबई महानगरपालिकेच्या कर्तव्यांमध्ये पर्यावरण संरक्षण आणि निसर्गाच्या संवर्धनाचाही समावेश आहे. बृहन्मुंबई महानगरपालिका कायद्यातील ‘कलम ६१(अ ब)’नुसार आपल्या बृहन्मुंबई महानगरपालिका क्षेत्रातील वनांचे व पर्यावरणाचे संरक्षण करणे आणि निसर्गाचे संवर्धन करणे हे महानगरपालिकेचे कर्तव्य आहे. तसेच बृहन्मुंबई महानगरपालिका कायदा ‘कलम ६३ ब’नुसार बृहन्मुंबई महानगरपालिका क्षेत्रातील पर्यावरणाबाबत ‘पर्यावरण स्थितीदर्शक अहवाल’ महापालिका सभागृहात दरवर्षी सादर करण्यात येत असतो. त्यानुसार आर्थिक वर्ष २०१५-१६चा ‘पर्यावरण स्थितीदर्शक अहवाल’ सादर करतांना मला आनंद होत आहे.

पर्यावरणीय प्रदूषण हा दिवसेंदिवस जागतिक चर्चेचा व चिंतेचा विषय ठरत आहे. पर्यावरणाचे संरक्षण व संवर्धन हा विषय केवळ राष्ट्रीय वा आंतरराष्ट्रीय पातळीवर महत्त्वाचा नसून तो स्थानिक पातळीवर देखील तेवढाच महत्त्वाचा विषय आहे. ही बाब लक्षात घेता, बृहन्मुंबई महानगरपालिका विविध स्तरावर पर्यावरण विषयक कार्ये करीत आहे. या अंतर्गत गेल्या आर्थिक वर्षात ‘भारतीय उष्णदेशीय मौसम विज्ञान संस्था’ (आयआयटीएम, पुणे) व ‘भारत मौसम विज्ञान’ (आयएमडी) या केंद्र सरकारच्या पृथ्वी विज्ञान मंत्रालयाच्या अखत्यारितील संस्थांच्या पुढाकाराने ‘सफर मुंबई’ हा प्रकल्प बृहन्मुंबई महापालिका क्षेत्रात राबविण्यात आला आहे. या प्रकल्पांतर्गत मुंबईतील १३ महत्त्वाच्या ठिकाणी हवामान व प्रदूषण विषयक माहिती ‘एलईडी होर्डिंग्ज’द्वारे तात्कालिक स्वरूपात प्रदर्शित करण्यात येत आहे. ज्यामुळे पर्यावरण विषयक जनजागृतीसाठी निश्चितच मदत होत आहे. या प्रकल्पांतर्गत महत्त्वाच्या चौकांमध्ये वा वर्दळीच्या ठिकाणी ‘एलईडी होर्डिंग्ज’ बसविण्यासाठी जागा उपलब्ध करून देण्यासोबतच या होर्डिंग्जसाठीचा विद्युत खर्च महापालिकेद्वारे केला जात आहे.

त्याचबरोबर ध्वनी प्रदूषणाच्या समस्येवर उपाययोजनेच्या दृष्टीने आराखडा तयार करण्यासाठी महापालिका क्षेत्रातील ध्वनी प्रदूषणदृष्ट्या संवेदनशील ठिकाणांच्या ध्वनी पातळीचे मापन (Noise level Mapping) करणे आवश्यक आहे. यानुसार ध्वनी पातळीचे मापन करण्याची कार्यवाही मे २०१५ पासून महापालिकेद्वारे करण्यात येत आहे. या अंतर्गत १,२०० ठिकाणांच्या ध्वनी पातळीचे शास्त्रोक्त पद्धतीने मापन करण्यात येत असून याबाबतचा अहवाल जानेवारी २०१७पर्यंत येणे अपेक्षित आहे.

बृहन्मुंबई महानगरपालिका क्षेत्रातील विविध परिसरांचे ध्वनी प्रदूषण संवेदनशीलतेच्या दृष्टीने विश्लेषण करण्यात आले होते. हे विश्लेषण करतांना त्या-त्या परिसरातील शैक्षणिक संस्था, न्यायालये, रुग्णालये आणि धार्मिक स्थळांजवळील परिसर या बाबींचा विचार करण्यात आला. त्यानुसार सप्टेंबर २०१५ मध्ये महापालिका क्षेत्रातील १,५०३ ठिकाणे ही शांतता क्षेत्र म्हणून घोषित करण्यात आली आहेत. या शांतता क्षेत्रांच्या शंभर मीटर परिसर दर्शविणारे नकाशे तयार करून हे नकाशे तसेच शांतता क्षेत्रांची यादी महापालिकेच्या संकेतस्थळावर उपलब्ध करण्यात आली आहे. अशा प्रकारे शांतता क्षेत्रांचे नकाशे प्रथमच मुंबई महापालिकेने आपल्या संकेतस्थळावर जनसामान्यांसाठी उपलब्ध केले आहेत.

बृहन्मुंबई महानगरपालिका क्षेत्रातील पर्यावरण संवर्धन करण्यासाठी अनेक उपक्रम बृहन्मुंबई महानगरपालिका राबवित असते. या अंतर्गत एक महत्त्वाचा उपक्रम म्हणजे महानगरपालिकेद्वारे हाती घेण्यात येणारा वृक्षारोपणाचा कार्यक्रम! आर्थिक वर्ष २०१५-१६ मध्ये रस्त्यालगत व महापालिकेच्या अखत्यारितील मोकळ्या जागांवर १६ हजार ३३ झाडे लावण्यात आली आहेत.

पर्यावरण संवर्धनाचा एक महत्त्वाचा भाग म्हणून महापालिका वर्षा जलसंचयन व विनियोग याबाबत देखील काम करीत आहे. विशेष म्हणजे वर्षा जलसंचयन व विनियोग पद्धती सक्तीची करणारी बृहन्मुंबई महानगरपालिका ही राज्यातील पहिली महानगरपालिका आहे. १ ऑक्टोबर २००२ पासून याबाबतची अंमलबजावणी करण्यात येत आहे. याअंतर्गत बांधकामदृष्ट्या विकासासाठी नव्याने येणाऱ्या १ हजार चौ. मी. किंवा त्यापेक्षा अधिक आकाराच्या सर्व भूखंडांवर वर्षा जलसंचयन व विनियोग पद्धती राबविणे सक्तीचे करण्यात आले आहे.

मुंबईची खरी संपत्ती ही मुंबईला लाभलेला विस्तीर्ण सागरी किनारा आहे. त्यामुळेच मुंबईच्या सागरी किनाऱ्याचे आणि सागरी पर्यावरणाचे संरक्षण करणे, संतुलन राखणे व संवर्धन करणे ही आपल्या सर्वांचीच जबाबदारी आहे. याच भूमिकेतून समुद्रात सोडले जाणारे मलजल हे अत्याधुनिक तंत्रज्ञानाचा वापर करून प्रक्रिया करूनच सोडले जावे, यासाठी महापालिका आग्रही आणि प्रयत्नशील आहे. या सर्व बाबींमुळे बृहन्मुंबई महानगरपालिका क्षेत्रातील पर्यावरणाचा समतोल राखण्यास मदत होणार आहे.





यास्तव, बृहन्मुंबई महानगरपालिका हद्दीत गोळा होणाऱ्या मलजलाची पर्यावरणीय दृष्टिकोनातून संवेदनशीलता लक्षात घेता महापालिका क्षेत्रामध्ये कुलाबा, वांद्रे, वरळी, घाटकोपर, भांडुप, वर्सोवा, मालाड अशा एकूण ७ परिमंडळांमध्ये ७ मलजल प्रक्रिया केंद्र कार्यान्वित आहेत. या मलजल प्रक्रिया केंद्रांच्या दर्जोन्नतीचे काम प्रस्तावित आहे. या मलजल प्रक्रिया केंद्रांची क्षमता दररोज सुमारे ३ हजार दशलक्ष लिटर एवढी आहे. याव्यतिरिक्त सर्व प्रमुख मलजल प्रक्रिया सुविधा केंद्र प्रकल्प कार्यान्वित झाल्यानंतर दररोज सुमारे १,५०० दशलक्ष लिटर एवढे प्रक्रिया केलेले पाणी उपलब्ध करण्याचे प्रस्तावित आहे.

बृहन्मुंबई महापालिका क्षेत्रात मार्च २०१६ पर्यंत २७ लाख ८६ हजार ५१२ एवढी वाहने नोंदविली गेली आहेत. या व्यतिरिक्त मुंबई शहरामध्ये दररोज बाहेरून येणाऱ्या वाहनांमुळे आणि नवीन वाहन नोंदणीमुळे या संख्येत भरत पडत आहे. यामुळे महापालिका क्षेत्रात वाहतूक कोंडी सोबतच वायु प्रदुषणाचा प्रश्न देखील बिकट होत चालला आहे. ही बाब लक्षात घेता महापालिका क्षेत्रातील वाहतुकीच्या दृष्टीने अमुलाग्र सुधारण करण्याकरिता 'सर्वसमावेशक वाहतूक आराखडा' (Comprehensive Mobility Plan) बनविण्यासाठी सल्लागाराची नेमणूक करण्यात आली आहे. त्यानुसार विविध अत्याधुनिक साधनांच्या साहाय्याने वाहतुकीचे सर्वेक्षण व त्यावर आधारित विश्लेषण करण्यात येत आहे.

मला खात्री आहे की, येणाऱ्या काही वर्षांमध्ये महानगरपालिकेच्या विविध खात्यांनी हाती घेतलेले प्रकल्प पूर्ण झाल्यावर, तसेच विविध उपाययोजना राबविल्याने मुंबईच्या नागरिकांना चांगले पर्यावरण उपलब्ध होईल. मला असेही निदर्शनास आणून द्यावयाचे आहे की, वैश्विक उष्ण्याचे दुष्परिणाम लक्षात घेता पर्यावरणाबाबत आधिक गांभिर्याने विचार होणे गरजेचे आहे. मुंबईच्या पर्जन्यमानात होत असलेला बदल हा जागतिक वातावरणात वाढत असलेल्या तापमानाचा परिणाम म्हणावा लागेल. जर आपण आपल्या सभोवलाच्या नैसर्गिक वातावरणाची वेळीच काळजी घेतली नाही तर पुढील पिढीला निसर्गाचा प्रकोप टाळता येणार नाही.

महापालिकेच्या विविध खात्यांद्वारे व सर्व प्रशासकीय विभागांद्वारे राबविण्यात येणारे नवीन प्रकल्प व त्या अनुषंगाने कार्यवाहीमध्ये पर्यावरणाचा विचार आवर्जून केला जात आहे. यामध्ये प्रामुख्याने पर्जन्यजल संवर्धन, सांडपाण्याचे पुनर्चक्रीकरण व त्याचे योग्य नियोजन, ऊर्जा बचतीचे प्रकल्प, सार्वजनिक वाहतूक-व्यवस्था सुधारणा, घन कचऱ्याची शास्त्रीय पद्धतीने विल्हेवाट लावणे इत्यादी बाबींचा समावेश आहे. तसेच भविष्यात हरित इमारतींच्या संकल्पनेसारख्या बाबींवर देखील कार्यवाही करण्याची बाब महापालिका प्रशासनाच्या विचाराधीन आहे.

महापालिकेद्वारे प्रस्तावित करण्यात आलेल्या 'सुधारीत प्रारूप विकास आराखडा २०३४' मध्ये पर्यावरणीय बाबींचा साकल्याने विचार करण्यात आला आहे. याबाबत आवर्जून नोंद घेण्यासारखी बाब म्हणजे सध्याच्या "विकास नियंत्रण नियमावली (१९९१)" मध्ये ४ प्रकारचे क्षेत्र अंतर्भूत होते. यामध्ये निवासी, वाणिज्यिक, औद्योगिक, ना-विकास क्षेत्र (NDZ) यांचा समावेश होता. तथापि, "सुधारीत प्रारूप विकास आराखडा २०३४" मध्ये प्रथमच 'नैसर्गिक क्षेत्र' (Natural Area) याचा अंतर्भाव करण्यात आला आहे. यामध्ये बृहन्मुंबई महानगरपालिका क्षेत्रातील जंगले, तलाव, नद्या, जलाशय, ओढे, कांदळवन (खारफुटीचे जंगल) आणि किनारपट्टीवरील दलदलीच्या प्रदेशांचा समावेश करण्यात आला आहे. या प्रकारच्या प्रदेशांचा समावेश 'नैसर्गिक क्षेत्र' या प्रकारच्या भू-वापर क्षेत्रामध्ये (Zoning) करण्यात आल्याने भविष्यात या ठिकाणी कोणत्याही विकासाला परवानगी दिली जाणार नाही. ज्यामुळे स्वाभाविकपणे मुंबई महापालिका क्षेत्रातील पर्यावरण संवर्धनास चालना मिळण्यासोबतच जैवविविधतेची जोपासना होणार आहे. 'नैसर्गिक क्षेत्र' या अंतर्गत असणाऱ्या जमिनीचे एकूण क्षेत्रफळ १२ हजार ८५९ हेक्टर इतके आहे. याचाच अर्थ मुंबई महापालिका नियोजन क्षेत्राच्या एकूण जमिनीपैकी २९.५९ टक्के एवढी जमिन 'नैसर्गिक क्षेत्र' या अंतर्गत असणार आहे.

वरील प्रकारच्या विविध स्तरावरील प्रयत्नांद्वारे बृहन्मुंबई महानगरपालिका क्षेत्राच्या पर्यावरण समतोलासाठी, संवर्धनासाठी कटीबद्ध आहे.

धन्यवाद !.

अजोय मेहता

महानगरपालिका आयुक्त
बृहन्मुंबई महानगरपालिका





ACKNOWLEDGEMENT

The excellent support and valuable inputs provided by MPCB, Mangrove cell, BEST, MMRDA, MSRDC, MSED, Transport department of Government of Maharashtra, RCF, MbPt, BPCL and various departments of Municipal Corporation of Greater Mumbai are gratefully acknowledged.

**Add. Municipal Commissioner (City)
Municipal Corporation of Greater Mumbai**





ACRONYMS

ALM	Advance Locality Management	MRTS	Mass Rapid Trasport System
AMR	Automatic Meter Reader	MRVC	Mumbai Railway Vikas Corporation
ATC	Area Traffic Control	MSDP	Mumbai Sewage Disposal Project
BEST	Brihanmumbai Electric Supply & Transport	MSEDCL	Maharashtra State Electricity Distribution Company Ltd
BMP	Best Management Practices	MSRDC	Maharashtra State Road Development Corporation
BRIMSTOWAD	Brihanmumbai Storm Water Drain	MSW	Municipal Solid Waste
BOD	Bio-chemical Oxygen Demand	MU	Million Units
CBO	Community Based Organization	MUIP	Mumbai Urban Infrastructure Project
CCRS	Central Control Redressal System	MUTP	Mumbai Urban Trasport Project
CCTV	Closed Circuit Television	NEERI	National Environment Engineering Research Institute
CNG	Compressed Natural Gas	NGO	Non Governmental Organization
CPCB	Central Pollution Control Board	NSS	National Social Service
CRZ	Costal Regulatory Zone	NWDA	National Water Development Agency
CTIRC	Civil Training Institute and Research Center	PAH	Polynuclear Aromatic Hydrocarbon
dB	Decibels (Unit of sound measurement)	PAP	Project Affected People
DCR	Development Control Regulations	PG	Play Ground
DO	Dissolved Oxygen	PSI	Pollution Standard Index
DPR	Detailed Project Report	PUC	Pollution Under Control
EIA	Environment Impact Assessment	RCF	Rashtriya Chemicals & Fertilizers
ETP	Effluent Treatment Plant	RE	Road Engineer
FC	Fecal Coliform	RG	Recreation Ground
FFC	Fact Finding Committee	RMMS	Road Maintenance Management System
FSI	Floor Space Index	RSPM	Respirable Suspended Particulate matter
GVW	Gross Vehicle Weight	RTO	Regional Transport Office
IEC	Information Education & Communication	SCADA	Supervisory Control & Data Acquisition
lcpd	Liters per capita per day	SSP	Slum Sanitation Programme
LPG	Liquified Petroleum Gas	SPM	Suspended Particulate Matter
MbPT	Mumbai Port Trust	SRA	Slum Rehabilitaion Authority
MCGM	Municipal Corporation Of Greater Mumbai	STP	Sewage Treatment Plant
MHADA	Maharashtra Housing & Area Development Authority	SW I	Seawater Criteria I
MIDC	Maharashtra Industrial Development Corporation	SW II	Seawater Criteria II
MLD	Million Liters Per Day	SWD	Storm Water Drain
MMC ACT	Mumbai Municipal Corporation Act	TC	Total Coliform
MMR	Mumbai Metropolitan Region	TDR	Transfer of Development Rights
MMRDA	Mumbai Metropolitan Regional Development Authority	TSP	Total Suspended Particulates
MOEF	Ministry of Environment & Forest	VJBU	Veermata Jijabai Bhosale Udyan
MOU	Memorandum Of Understanding	WSSD	Water Supply & Sewerage disposal.
MPCB	Maharashtra Pollution Control Board	WWTF	Waste Water Treatment Facility





TABLE OF CONTENTS

Sr. No.	SUBJECT	Page No.
1	MANOGAT	ii
2	ACKNOWLEDGEMENT	iv
3	INTRODUCTION	1
4	DESCRIPTION OF AREA	1
5	CLIMATE OF MUMBAI	1
6	POPULATION OF MUMBAI	2
7	LAND USE	3
8	MANGROVES IN MUMBAI	7
9	RECREATION FACILITIES	8
10	WATER SUPPLY	11
11	RAINWATER HARVESTING IN MUMBAI	18
12	SEWAGE DISPOSAL	20
13	STORM WATER DRAINAGE SYSTEM	26
14	SOLID WASTE MANAGEMENT	29
15	POWER SUPPLY AND CONSUMPTION	36
16	ROADS, TRAFIC AND TRANSPORT	39
17	HOUSING & SLUMS	45
18	EDUCATION	46
19	AIR QUALITY STATUS	47
20	SAFAR MUMBAI	53
21	NOISE LEVELS	56
22	INDUSTRIES	58
23	HEALTH	59
24	DISASTER MANAGEMENT	68
25	CHALLENGES BEFORE US	70
26	SALIENT FEATURES OF MUMBAI'S ENVIRONMENT	71





Vaitarna Dam



Overflowing Vihar lake





INTRODUCTION

The 74th amendment of the constitution of India in 1992 defines the role of municipalities & municipal corporations. The 12th schedule to the amended constitution states the scope of the work. The scope includes environment protection, promotion of ecology & urban forestry. As a sequel to this, the Maharashtra state government issued an ordinance to amend municipal act, 1888 making “Environment Protection, Promotion of Ecology & Urban Forestry” as an obligatory duty vide section 61(ab) in the year 1994. The Environment Status Report (ESR) of the city of Mumbai for the period from April 2015 to March 2016 is prepared by Air Quality Monitoring and Research Laboratory (AQMRL) of Environment section in Solid Waste Management (SWM) department to fulfill the obligation under the clause 63-B of Mumbai Municipal Corporation (MMC) Act 1888. The ESR is based on the factual data generated using parameters affecting the environment by different departments of MCGM as well as the data provided by the various departments of state/central government and industries.

DESCRIPTION OF THE AREA

Mumbai is located on the western sea coast of India from 18°53' North to 19°16' North Latitude and from 72° East to 72°59' East Longitude. It was originally a cluster of seven islands. Later on, these islands were joined to form present Mumbai.

Area of Mumbai above sea level as per Development Plan is 458.53 sq. km, though the total area specified by Surveyor General is 603 sq.km., which includes territorial waters extended into sea up to 12 nautical miles measured from appropriate base line. Its maximum width is 17 km. (East to West) and length is 42 km. (North to South).



CLIMATE OF MUMBAI

The city of Mumbai has Tropical Savanna climate. Generally South-West monsoon arrives in the city in the month of June and retreats in the month of September. The data recorded by Disaster Management Department of MCGM at Colaba & Vile Parle shows that Mumbai received a total rainfall measuring 1648.7 mm & 1881.7 mm respectively. The maximum rainfall of 866 mm was recorded during the month of June 2015 at Colaba, which is 52.5% of total rainfall & maximum rainfall of 1112.5 mm was recorded during June 2015 at Vile Parle,

TABLE NO. 1 METEOROLOGICAL DATA 2015-2016

MONTH	AVERAGE TEMPERATURE °C				RAINFALL in mm		AVERAGE RELATIVE HUMIDITY %				WIND SPEED km/hr	
	COLABA		VILE PARLE		COLABA	VILE PARLE	COLABA		VILE PARLE		COLABA	VILE PARLE
	MAX	MIN	MAX	MIN			MAX	MIN	MAX	MIN		
Apr-15	33.4	27.4	33.0	29.1	0	0	81	54	83	70	24.1	22.5
May-15	34.4	27.3	34.7	27.5	0	0	82	57	88	68	30.6	24.1
Jun-15	34.6	23.9	36.1	23.5	866	1112.5	99	54	96	58	45.1	40.2
Jul-15	33.1	24.5	32.8	24.5	285	355	97	61	95	73	33.8	41.8
Aug-15	32.2	25.1	32.2	24.6	188	155	96	61	100	72	32.2	27.1
Sep-15	37.1	24.2	38.1	23.4	165	199	100	34	94	45	51.5	30.6
Oct-15	37.4	25.2	38.4	24.7	40.9	57.2	97	28	85	39	33.8	37
Nov-15	36.4	25.2	37.1	23.7	3.8	3	90	19	86	26	27.4	30.6
Dec-15	35.5	19.5	35.8	17.9	0	0	89	15	84	20	29	20.9
Jan-16	33.7	20.1	33.4	18.6	0	0	85	18	86	23	33.8	25.7
Feb-16	31.7	20.6	31.8	22.6	0	0	91	19	90	24	41.8	14.5
Mar-16	35.6	24.9	35.5	23.7	0	0	86	23	89	32	32.2	37

Source: Disaster Management Department of MCGM





which is 59.1% of the total rainfall. Over all, there was less rainfall as compared to previous year. The monthly data of temperature, rainfall, relative humidity and wind speed for Mumbai is shown in the table NO.1. The maximum temperature of 37.4°C in October 2015 and minimum temperature of 19.5°C in December 2015 was recorded at Colaba. Whereas maximum temperature of 38.4°C October 2015 and minimum temperature of 17.9°C December 2015 was recorded at Vile Parle.

POPULATION OF MUMBAI:

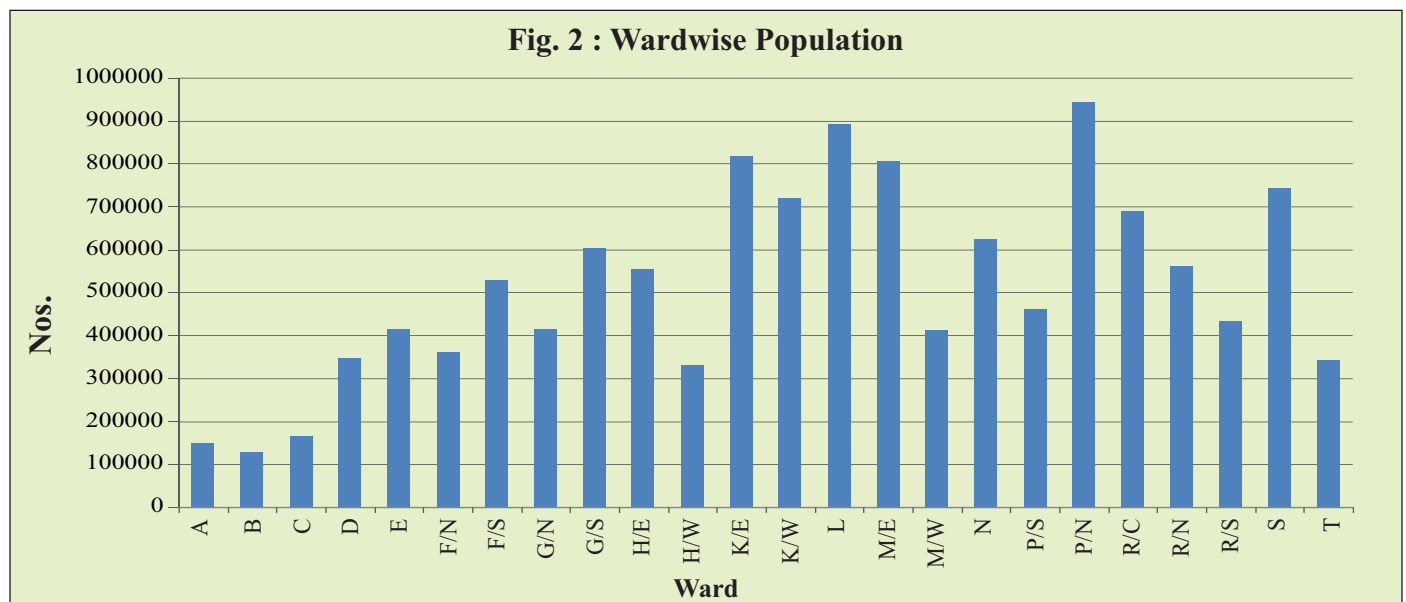
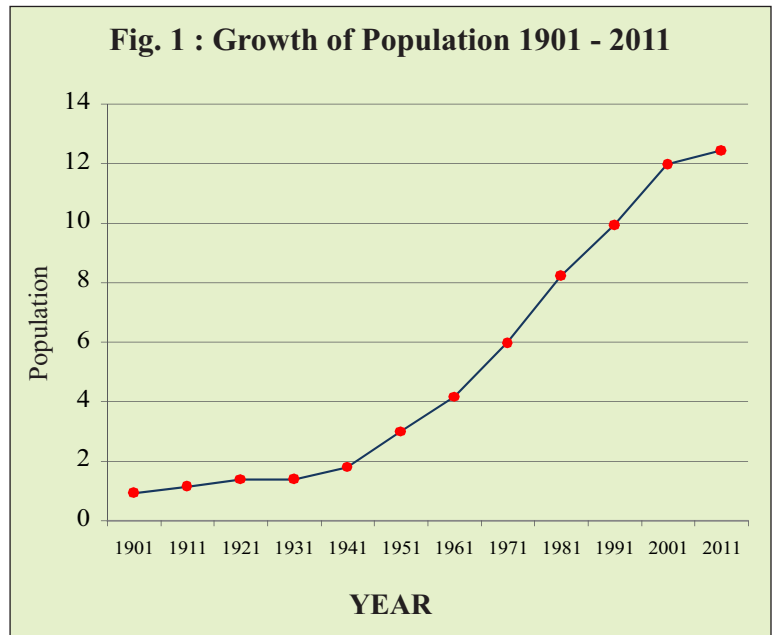
Mumbai is one of the important cities of the world, is also recognized as the most thickly populated city. Ever increasing population causes serious impact on its environment.

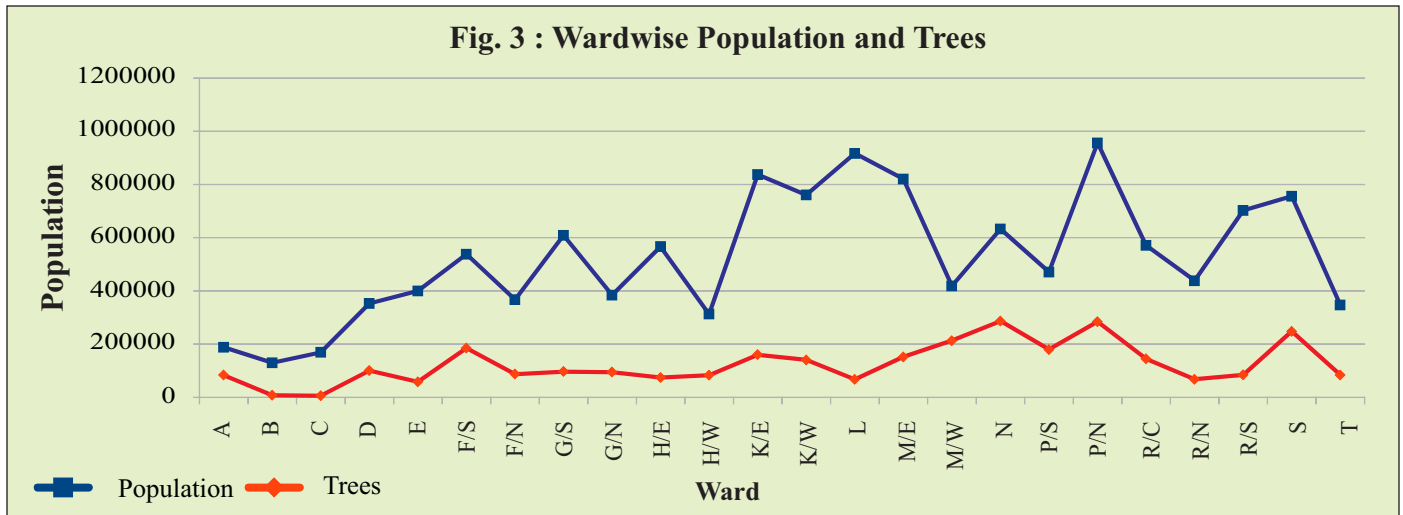
As per data received from Health Department of MCGM the estimated population of Mumbai was 12.64 million. The population density of 27,573 person per sq. km (excluding no development area). Mumbai is the most densely populated city in India.

Table 2 : Growth of Population and rate of Increase during year 1901-2011

Year	Population in millions	Percentage Growth
1901	0.93	-
1911	1.15	23.7
1921	1.38	20
1931	1.4	11.5
1941	1.8	28.6
1951	2.99	66.1
1961	4.15	38.8
1971	5.97	43.8
1981	8.22	38.0
1991	9.92	21.1
2001	11.97	20.6
2011	12.64	3.8

Source : Census Department of India





Administrative Ward-wise population indicates that P/North ward with 9,56,564 persons has maximum population where as B ward with 1,29,354 persons has minimum population. (Table no.3)

LAND USE

Mumbai was the first city Municipal Corporation to adopt the concept of a development plan and the first development plan was formulated in 1964 and was sanctioned in 1967. The second development plan came into force in 1991-94 and was valid up to 2013 and now new plan for 2014-34 is submitted for approval.

Out of the total area within administrative boundaries of Greater Mumbai 10327 hectares area is in residential use, 3515 hectares in commercial and industrial use. For open places 1538 hectares, public amenities 7528 hectares area is under use, undeveloped area 14388 hectares, area under special planning authorities is for 4323 hectares and for other uses 3891 hectares area is in use, which includes primary activities, defense area and areas under construction.

Greater Mumbai with population of 12.64 million, is India's most populous city. It is country's financial centre, it serves as the core city of Mumbai Metropolitan Region and is amongst the top ten largest Urban

Table 3 : LAND USE CLASSIFICATION OF GREATER MUMBAI

Existing Land Use Categories	AREA (in hectares)	% of Total Area
Residential	10327	22.52
Commercial & Industrial	3515	7.66
Open Spaces	1538	3.35
Public Amenities	7528	16.42
Others	3891	8.48
Undeveloped Area	14388	31.38
Area under Special Planning Authority	4323	9.21

Source: D.P.Dept of MCGM

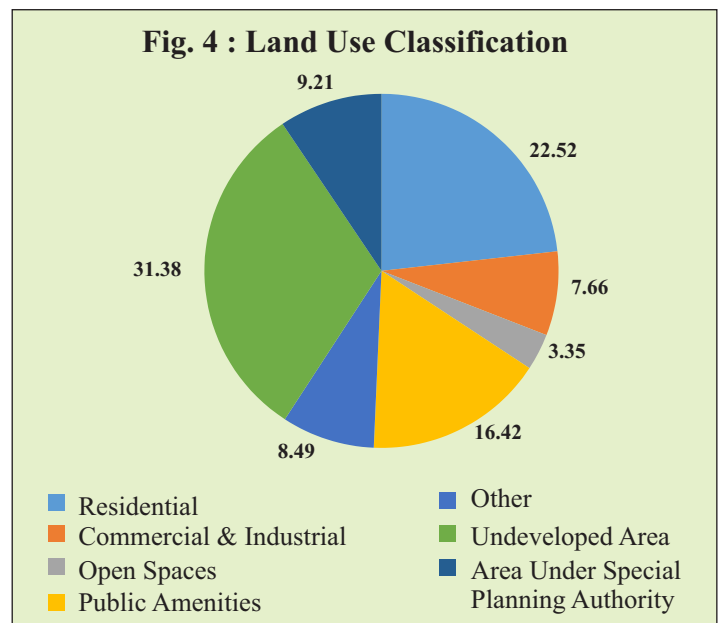




Table 4 : WARDWISE POPULATION

WARD	Area in Sq.km.	Trees	Population
A	11.21	83201	188001
B	2.66	7816	129354
C	1.91	5756	168844
D	8.22	100317	352466
E	7.27	58028	399636
F/S	9.79	184837	537575
F/N	12.28	87240	366800
G/S	9.29	96620	608710
G/N	8.76	94774	383848
H/E	12.42	74092	566235
H/W	9.03	83176	312547
K/E	23.96	160004	837186
K/W	24.55	140674	760775
L	15.68	676758	916791
M/E	33.08	151949	820760
M/W	17.4	213084	418543
N	25.96	286894	632909
P/S	25.19	179452	470990
P/N	46.72	284271	956564
R/S	18.31	144790	571238
R/C	48.03	67808	438332
R/N	14.18	84510	702389
S	29.75	248116	755792
T	42.88	84187	346976
Total	458.26	2989654	12643252

Source : D. P. & Health Dept. (MCGM)

agglomerations in the world. Greater Mumbai is however severely constrained by its geography and occupies a small land area of 458.53 sq. km with a limited supply of land. Out of the total area of Greater Mumbai, the area under the Special Planning Authorities (SPA) is 43.23 sq.km, accounting for about 9.21% of the total area. The information received from Development Project & Health Dept. of MCGM regarding wardwise area & population for year 2015 is provided in Table no.4.

In the draft D. C. Regulation 2034, rules have been incorporated for environmental sustainability e.g. Grey Water recycling, rain water harvesting, sewage treatment plant and it is compulsory & encouraged for proposed residential complexes, new buildings and redevelopments.

As per provisions of Sec. 26 (1) of the M.R. & T.P. Act, 1966, the Government has granted extension to republish the order under No. TPB 4313/1265/C.No.27/2014/UD-11, dated 14.01.2016. The work of revised Draft Development Plan – 2034 is in progress.

Municipal Corporation of Greater Mumbai has carried out existing land use survey in 2012 and made Existing Land Use Map 2012 (ELU 2012) which captures data at the parcel level according to ELU Natural Areas and Open Spaces constitute about 31.50% of the total area (within Administrative Ward Boundaries) of Greater Mumbai of this 81.40% is Natural Areas such as forest, mangroves and water bodies. Open spaces available for parks and play grounds etc. occupy 17.70% of the total area.

Greater Mumbai is however severely constrained by its geography and occupies a small land area of 458.53 sq. km with a limited supply of land.

Coastal Regulation Zone:

Greater Mumbai is an island and hence, Mumbai city is surrounded by sea on all sides. As such, most of the Greater Mumbai areas are affected by Coastal Regulation Area and this is related to the environment of the City. Hence, No objection Certificate from M.C.Z.M.A. is necessary for development of land. Around 6000 hectares of land is available in the form of 'mangrove forest' along Coastal Line of Mumbai City and it is a great blessing for Mumbai City.

MoEF has issued CRZ Notification vide No. S.O.19 (3) dated 06.01.2011, in super-cession of the earlier notification S.O. 114 (E) of 19.02.1991.

The objectives of the new CRZ Notification include the need to ensure livelihood and security to the fishing communities, to protect the Coastal Environment and to give impetus to economical undertakings in CRZ areas.



There is specific mention in para 8, sub para 5(1) of the notification regarding the need for redevelopment of housing for local communities, slums existing near coastal region, as well as redevelopment of dilapidated buildings considering importance of Mumbai city.

The new notification has made it obligatory on State Authority to demarcate HTL and Hazard line and also to prepare new CZMP within 24 months through authorized agencies of Central Govt. This aspect is being separately dealt with by the D.P. department.

The work of preparing new Coastal Zone Management Plan as per CRZ notification dated 6th January 2011 has been entrusted by MCGM to the institute of Remote Sensing, Anna University, Chennai. Director (IRS) has prepared Draft CZMP with all relevant information using Remote Sensing, Global Positioning System of Geographical Information System as per provision of Coastal Zone Regulation Guideline 2011. The Draft CZMP has been submitted to the Principal Secretary and Chairman MCZMA on 29.01.2015 for inviting the suggestion and objection in accordance with the Environment (Protection) Act 1986/EIA Notification 2006. Subsequently as per the instructions received from the MoEF and CC the draft CZMP prepared by IRS has been sent to the Director, National Centre for Sustainable Coastal Management who shall need to vat and submit the same to MoEF & CC.

CRZ details of Greater Mumbai Municipal Corporation.

Total HTL Length	- 433.22 km	CRZ III	- 9.20 Sq.km
HTL along creek	- 297.40 km	CRZ-IVB	- 41.74 Sq.km
Total area of Mangroves	- 54.14 Sq.km	Mudflats	- 11.59 Sq.km
Mangrove buffer zone (CRZ I)	- 76.85 Sq.km	Salt-pan	- 2.0 Sq.km
CRZ II	- 33.91 Sq.km	PG, RG, Green Areas, Park. etc.	- 2.62 Sq.km

Fig. No. 5 :

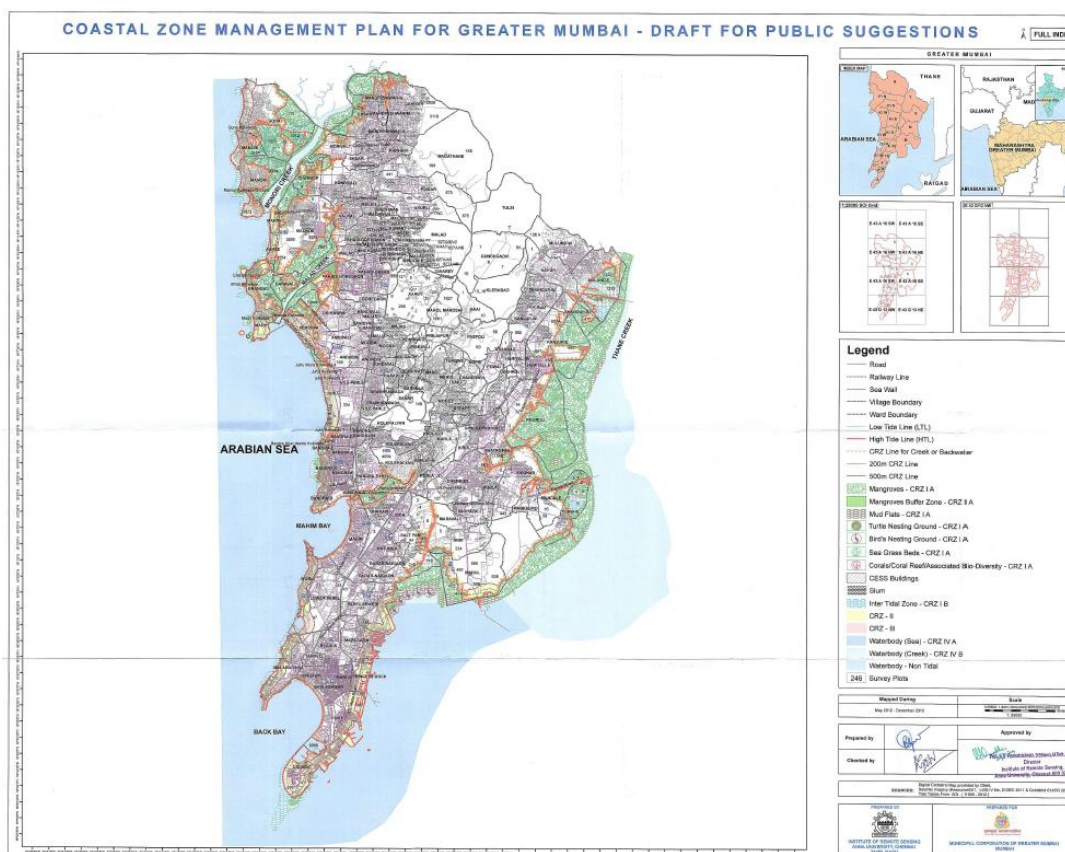
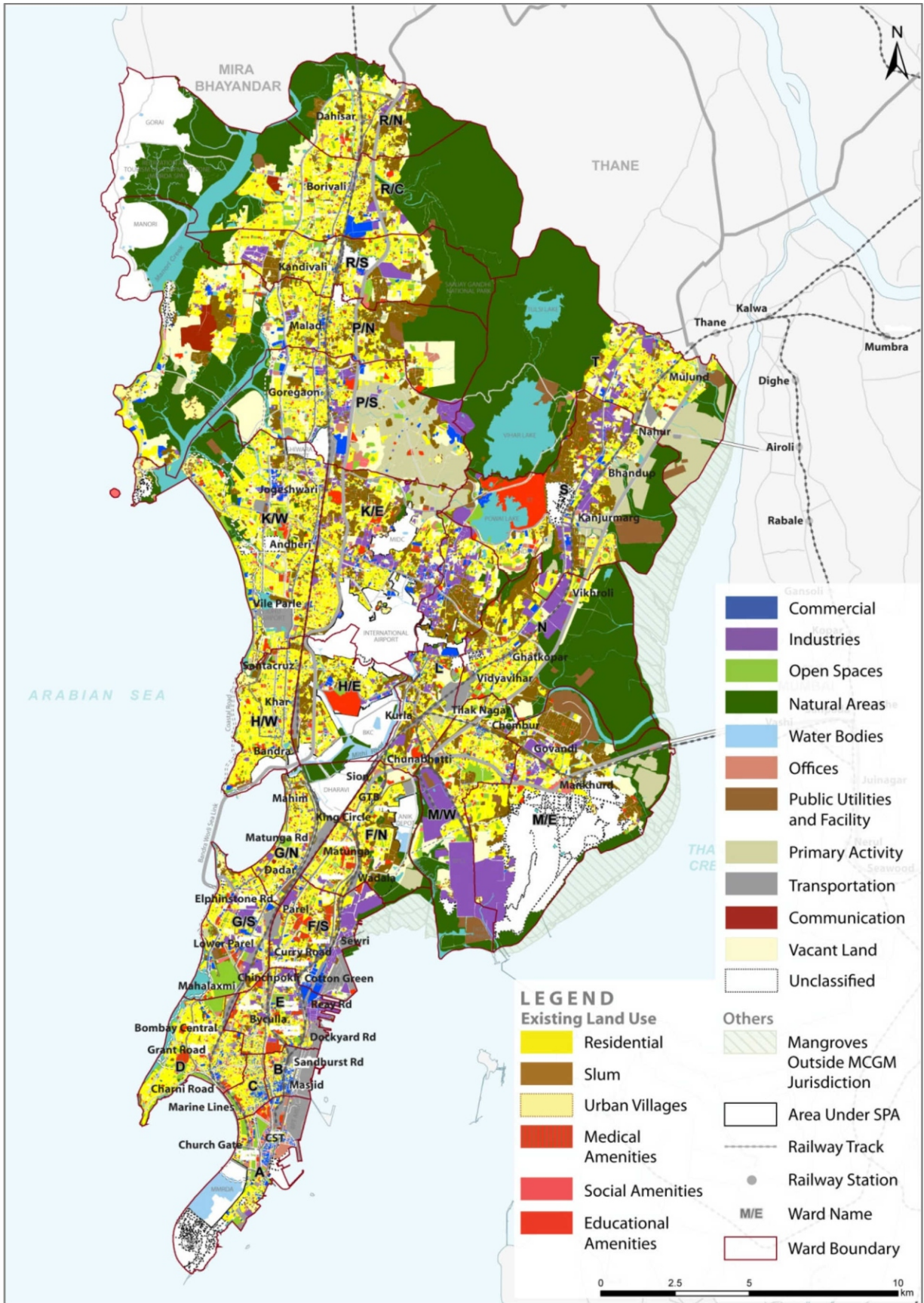




Fig. No. 6 :





MANGROVES IN MUMBAI

Uniqueness and importance of mangroves:

The zone between sea and land is quite an inhospitable place for life to thrive. The water is salty, substratum is anoxic and the soil is alternately exposed and submerged due to tidal action. The only species of trees that can thrive in this organic environment are mangroves, which have developed special adaptation for this purpose. Every mangrove species is an ecosystem in itself. Its roots act as substrate for sessile organisms like oysters and barnacles, its crown a rookery for swamp birds and the flowers are a good source of honey. The leaves are raw material for ants engaged in nest building and when they fall, they form the basis of food chain in the surrounding waters.

Mangroves confer a variety of benefits to mankind. They are natural barriers against sea intrusion, as demonstrated well during the Tsunami that hit our coast in 2004. By breaking up large storm surges and strong tidal currents they protect sea coast from erosion. They are important land builders which filter sediments from land and expand the extent of land towards sea. The enormous productivity of mangrove swamps enables them to support a rich faunal diversity. The unique habitat acts as nursery grounds for many species of fish and shell fish and offer protection to many juveniles against predators. This way, the lives of millions of fishermen in our country are linked directly to the existence of healthy mangroves. Scientific studies prove that the ability of mangrove forest to absorb Carbon dioxide from atmosphere and burry it in the soil is six times that of Amazon rain forest. This shows how important mangroves are in our effort to fight climate change and sea level rise.

According to forest survey of India, the total extent of mangroves in Maharashtra is 186sq.km, distributed along its six coastal districts. The thickly populated city of Mumbai alone has about 6000 hectares of mangroves, which is perhaps the largest extent of mangroves for any metropolitan city in the world. Mangroves are the green lungs for the city, which ensures abundant supply of oxygen to us. They also maintain the stability of the shoreline and prevent the release of toxic wastes into the waters around Mumbai, thus paying a silent life supporting role. Their ability to absorb large volumes of water is a great boon to a city, which is prone to heavy rain and flooding from time to time.

Unfortunately, the mangrove ecosystem of Mumbai is under severe threat due to several factors. Land in the coastal areas is in great demand, for expansion of real estate, setting up of industries and public utilities. A lot of construction debris gets dumped in these lands and tons of pollutants are released here, choking the mangroves to death. Many mangrove areas have been converted into salt pans and aquaculture ponds in the past. In rural areas, mangroves are also felled for fuel wood and small timber. The rate of mangrove cover is a matter of great concern and the alarm bells are loud and clear.

On 6th October 2005, the High Court of Bombay issued a landmark order to save the mangroves of Maharashtra coast. This judgment mandated that mangroves on government land be declared as Protected Forests and those on private lands as "Forests". The Hon'ble High Court prohibited any construction within 50 m from the boundary of the mangroves and also put a ban on dumping of debris in the mangrove areas. Following this order, Mumbai was notified as Protected Forest. To improve the protection status of mangroves on government, the state has decided to notify all such areas as Reserved Forest.

To give further fillip to the mangrove conservation efforts in Mumbai region a 'Mumbai Mangrove Conservation Unit' (MMCUC) has been created on 17th May 2013. The Cell is headed by a Chief Conservator of forest and is functioning from its office in Bandra, Mumbai.

For conservation of mangroves, Chief Conservator, 'Mangrove Cell' carried out following works:

- 1) 3 lakh mangrove saplings were raised in nurseries.
- 2) In Mumbai and New Mumbai areas 5 Mangrove nurseries have been formed on 56 Hectare land.





Municipal Corporation of Greater Mumbai

- 3) Assisted natural re-generation works in Mumbai at 3 locations namely, Bhandup, Mahul and Gorai extending to 22 hectares to facilitate tidal water flow in mangrove areas.
- 4) Display boards, signage etc. to create awareness about the need for mangrove conservation.
- 5) Plantation programs in collaboration with NGO's.
- 6) Promenades at the landward edge of mangrove areas being planned with the support MCGM and residential association.
- 7) Legal action to evict encroachments on mangrove land will be initiated by MNCU in Mumbai.
- 8) Training, Awareness generation and publicity works will be scaled up.

Urban Renewal Scheme:

MCGM and Maharashtra Housing & Area Development Authority (MHADA), a state government agency have undertaken city renewal scheme as per development rules. This provision will enable redevelopment of old dilapidated municipal and other tenanted buildings and to make available vacant land for various civic amenities.

RECREATIONAL FACILITIES:

Providing recreational amenities to the public is a discretionary duty of the Corporation under section 63 of MMC Act 1888. For balanced environment, abatement of air pollution and Green Mumbai, beautiful and clean Mumbai, MCGM provides recreational amenities to the citizens of this city by way of maintaining gardens and providing playgrounds (PG), recreational centers, water fountains, etc. In addition to recreation, MCGM also encourages sports, art, cultural programs etc. Whereas health education and health promotion of citizens being its objective. These facilities are utilized by citizens as well as others from different places. (Table No.5)

GARDEN DEPARTMENT

For tree conservation, Garden department has done following work in the year 2015-16,

- 1) About 16336 no. of trees are planted on Municipal roads and open spaces.
- 2) Removal of concrete, asphalt, tar and cement around 27385 no of tress.
- 3) Spraying of insecticides and pesticides on infected trees.
- 4) Trimming of 7753 tree branches to balance the trees.
- 5) Formation of Tree basins around the trees.
- 6) Removal of 392 no. of dead and dangerous trees.
- 7) During 2015-16 the Municipal Corporation of Greater Mumbai and the Tree Authority has organized the exhibition of plants, flowers, fruits and vegetables from 12th to 16th February at Virmata Jijabai Bhosale Udyan. To create consciousness and awareness about environment among the citizens and to develop importance of trees and vegetation to human welfare, the Workshop on various horticultural subjects was also arranged during the same period.

In the year 2016-17 around 1 lac trees are proposed to plant on roadside and on other places in MCGM jurisdiction.

Work of Tree Census (except mangroves and forest area) is undertaken in 2015-16. Work of tree census in 15 wards is completed. As per Tree Census Report there are 29,89,654 no. of trees in the city. The maximum no. of trees (2,86,894) is in 'N' ward and the minimum no. of trees (5,756) is in 'C' ward.

Veer mata Jijabai Bhosale Udyan & Zoo:

Veer mata Jijabai Bhosale Udyan & Zoo is one of the oldest zoos in the country established in the year 1862. This area was under the control of Agri-Horticultural Society of Western India. The management of this Udyan & Zoo was handed over to MCGM by the then state govt. in 1873. The total area of this Udyan & Zoo is approx.



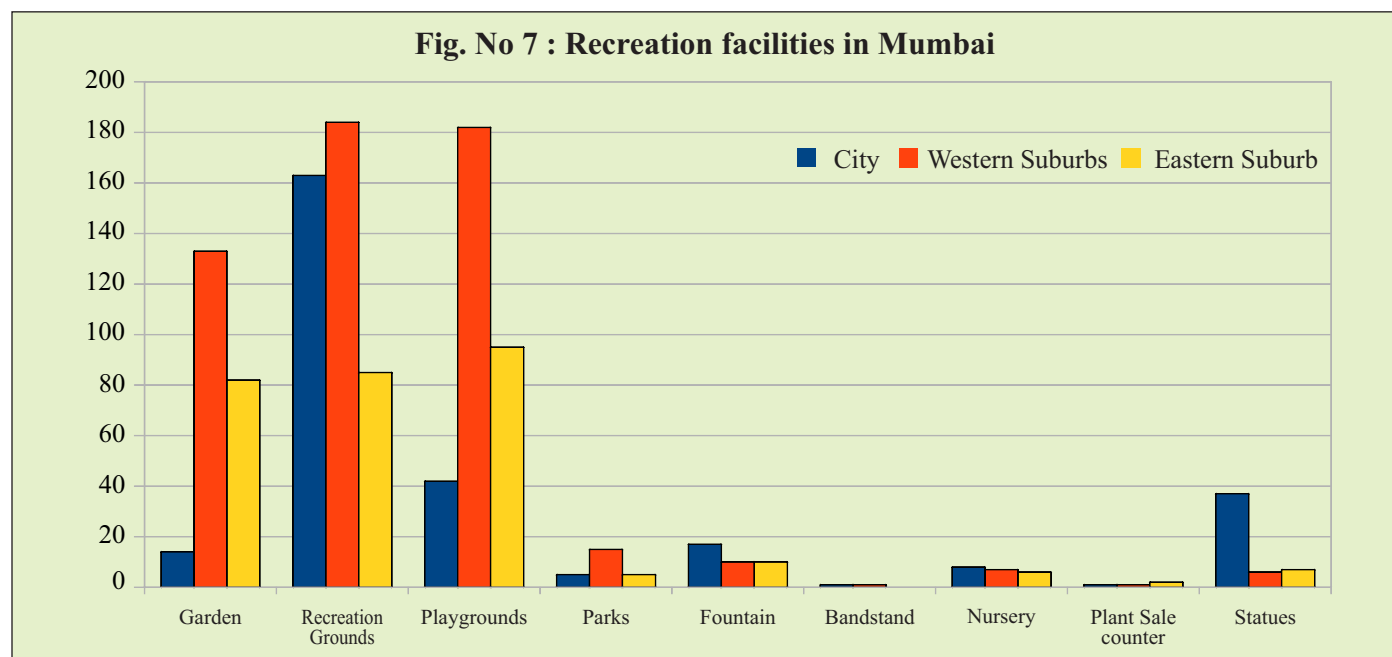
of 53 acres and is declared as “Heritage Grade II (B)” site. This zoo is visited by a large number of visitors every year. During the year 2015-16 nearly 12,50,177 people visited the zoo. With this the total revenue earned during 2015-16 is around Rs.68,00,832/-.

There are about 3213 trees of 285 species, which included rare indigenous and exotic varieties of plants having medicinal, aromatic and economic importance. This Udyan is visited by botanical

Table 5 - RECREATION FACILITIES upto 2016

Sr. No.	CATEGORY	CITY	WESTERN SUBURBS	EASTERN SUBURBS	TOTAL
1	Gardens	14	133	82	229
2	Recreation Grounds	163	184	85	432
3	Playgrounds	42	182	95	319
4	Parks	5	15	5	25
5	Fountains	17	10	10	37
6	Band stands	1	1	0	2
7	Nurseries	8	7	6	21
8	Plant sale counters	1	1	2	4
9	Statues	37	6	7	50
10	Trees Plantation	310	14831	1195	16336
11	Distribution of tree Re. 1/- per plant	11959	5525	4145	21629
12	Total No. of trees	718589	1219077	1051988	2989654

Source: This information is received from Garden Department of MCGM.



researches and students regularly. Existing species of trees have been surveyed and map of biodiversity has been prepared.

About 16336 no. of trees are planted on Municipal roads and open spaces.

Veermata Jijabai Bhosale Udyan & Zoo at present:

- As on 31st March 2016, there are in all 429 animals, which include 133 mammals of 14 Species, 264 Birds of 29 species and 32 Reptiles of 6 species displayed in this Udyan & Zoo.
- As per the guidelines laid by the Central Zoo Authority, New Delhi, under the “National Zoo Policy 1998” the main objective of establishment of a Zoo is to protect, conserve & breed the rare and endangered animal.



Municipal Corporation of Greater Mumbai

- Various educational activities like Wildlife week, World Earth Day, World Environment Day, Animal keepers training programs, Zoo Awareness Programs etc. are conducted at Veermata Jijabia Bhosale Udyan & Zoo for creating empathy and awareness about Wildlife, Nature & Environment in the minds of citizens and school/college students.
- Work for modernization of this udyan and zoo are been carried out.

Modernization Project of Veermata Jijabia Bhosale Udyan & Zoo :

- A new Master Plan has been got prepared through Thailand based agency namely, M/s HKS Designer and Consultant International Co. Ltd. And the said consultant is appointed as the 'Project management Consultant'. The Master (Layout) Plan has been approved by the Central Zoo Authority (CZA), New Delhi on 05.12.2012.
- As per the approved Animal Collection Plan animals like Hyena, Jackal, Wolf, Sloth bear, Gaur, Swamp deer, Sambar, Black buck, Nilgai, Small cat complex, Bird Aviary 1 & 2, Common otter, Asiatic lion, Bengal Tiger, Emu, Hippopotamus, Jagura, Zebra & Humboldt Penguin & Marine Fish will be displayed at this Udyan & Zoo.

Construction works of Interpretation Centre building, asphaltting of internal roads, restoration of heritage structures, zoo hospital, quarantine area, peripheral wall and service roads are completed under first phase of the project. Construction of new moats around the enclosures will be avoided and the existing moats will only be modified as per the requirements of animals exhibited in it. In general, acrylic/glass panels will be used.

On Mafatlal mill area which is nearby zoo, animal inhabitants for Jiraf, Zebra, Valebi, Sea horse etc. will be created. Master layout plan for zoo is submitted to Central Zoo Authority, New Delhi.

Work of Tree Census (except mangroves and forest area) is undertaken in 2015-16. Work of tree census in 15 wards is completed. As per Tree Census Report there are 29,89,654 no. of trees in the city.

Contribution of other Industries towards improvement of “Green Belt” in Mumbai:

In addition to MCGM, other major industries also contribute in the development of “Green Belt” in Mumbai.

Rashtriya Chemicals & Fertilizers Limited:

The following Innovation Schemes are implemented in the field of environment at Rashtriya Chemicals & Fertilizers Limited, Trombay Unit in the year 2015-16.

- 2 MWp Solar PV Power Plant was commissioned on 27th January 2016. The Plant has the potential for generation of around 3 million units of green power per annum.
- Installation of New Sewage Treatment Plant with a capacity of 23 MLD of municipal sewage and generates around 15 MLD for treated water for industrial use. Implementation of this project is not only helps in making us self sufficient in meeting our daily industrial water requirement but also contributes towards our national mission of 'Swachh Bharat Abhiyaan'.
- Real Time Stack emission Monitoring data from Suphala Plant, Nitric Acid Plant, Sulphuric Acid Plant and Effluent Monitoring data from Effluent Treatment Plant are transmitted to Maharashtra Pollution Control Board (MPCB) and Central Pollution Control Board (CPCB) on a continuous basis from June 2015.
- In Suphala Plant Reversible Osmosis water from Sewage Water Treatment Plant is used as make up in reactor scrubbing section for equipment cleaning, floor washing etc. is carried out in order to conserve treated water.





- Installation of higher capacity Caustic Scrubber Tank in Sulphuric Acid Plant to improve the performance of Start-Up Scrubber and minimize the SO₂ emission.
- With adoption of 3R (Reduce, reuse & recycle) methodology, about 80% of the effluent generated is reused in the plant.
- Further for rain water harvesting a natural pond near Sewage treatment plant is beautified & maintained.
- Four fixed ambient air quality monitoring stations are installed for continuous monitoring of ammonia, oxides of nitrogen, sulphur dioxide and particulate matter. One of the stations is also equipped to monitor micro meteorological parameters. To maintain the transparency ambient air monitoring data displayed at the entrance of the factory for public view. Apart from the above Ambient Air Quality Monitoring and Stack Monitoring is carried out periodically in our Central Chemical Laboratory. Also the third party monitoring of stack and Ambient Air Quality is carried out on a regular basis by MoEF approved laboratory.
- RCF, Trombay Unit has adopted two pronged strategy for control of water pollution. Each process plant has its own effluent pit where effluent generated in the plant is collected. Sewage water is discharged after treating in E.T.P. as per standards MINAS.

Public Awareness Programme :

RCF provides horticulture advice to the needy persons free of cost. Many informative sessions for farmers and other institutes are also arranged on a regular basis.

Mumbai Port Trust :

Mumbai Port Trust is one of the important port in India. Along with Bombay Natural History Society (BNHS) has undertaken a program for restoration of Mangroves which is known as “MbPT Marine Diversity Conservation Program” with a total budget of Rs.2.12 Crores approximately. They have already taken up the work of developing mangrove nursery with a capacity of 20,000 saplings and it is learnt that the work of plantation will be taken up in monsoon. M/s. BNHS have also started the work of the project “Saving Flamingoes, Mangroves and Mudflats of Sewree and adjoining areas”. M/s. BNHS has organized a Flamingo Festival in March, 2016 and thanked Mumbai Port Trust team for co-operation for the above project.

NEERI has prepared Environmental management Monitoring Plan (EMMP) and Green Port Plan for Mumbai Port. It has been accepted by Board of Trustees and action will be initiated to implement the plan.

Mumbai Port Trust has decided to stop handling of coal at Haji Bunder vide Public Notice No. TM/M/13-2(A)/26 of 2015-16 dated 04.09.2015.

Mumbai Port Trust has developed and maintained, a Botanical Gardens named as 'Sagar Upvan' in the Port area. The water used for this garden is from the sewage treatment plant constructed by MbPT, in the garden. The capacity of sewage treatment plant is 250 cu.m/day. A small terrace garden is being grown using kitchen waste. MbPT also maintains many small gardens & green patches/belts in its estate. It has received 'Best Garden Award' in its category of nine years successively.

A budget provision is made every year for improvement of Environment. Removal of oil and allied substances is carried out by using small boats from this provision. Procurement of oil spill instruments under National Oil Spill Disaster Contingency Plan is in process.

WATER SUPPLY

Population of Mumbai is 12.64 million as per 2011 Census. Estimated population upto 2041 will be 17.20 million with water demand of 5940 MLD. Present water supply available at source to MCGM is 4070 MLD and net supply to Mumbai is 3750 MLD (including en-route water supply of 150 MLD). The water available from various lake sources is given in table No.6



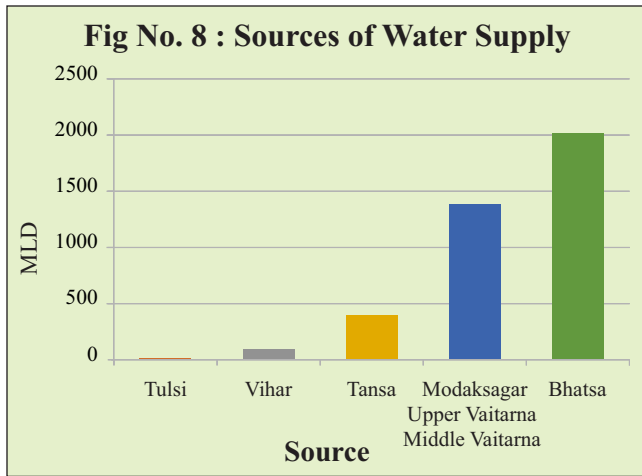


Table 6 - SOURCES OF WATER SUPPLY

SOURCE	Yield in MLD	Ownership	Distance from City	Treatment Plant
Tulsi	18	MCGM	City limits	Tulsi
Vihar	90	MCGM	City limits	Vihar
Tansa	400	MCGM	100 km from city	Bhandup Complex
Modak Sagar	1380	MCGM	100 km from city	Bhandup Complex
Upper Vaitarna		GoM	173 km from city	Bhandup Complex
Middle Vaitarna		MCGM	137 km from city	Bhandup Complex
Bhatsa	2012	GoM	100 km from city	Panjarapur & part at Bhandup Complex
Sub-total	3900			
Enroute supply + Losses	-150			
Total supply to city	3750			

Mumbai city and suburban areas are being supplied with 3750 million liters of water on a daily basis however, this year due to poor monsoon 15% water cut is imposed on water supply. This water is drawn from various lakes as well as river sources. Out of above 3750 MLD water, 2100 MLD is treated at Bhandup Complex and is supplied to city and western suburban wards.

Source: Hydraulic Engineer's Dept.,MCGM

Table 7 - WATER QUALITY BEFORE AND AFTER FILTRATION DURING 2012 - 2013

Parameter	TULSI		VIHAR		BHANDUP COMPLEX (TANSA, VAITARNA & UPPER VAITARNA)		PANJRAPUR (BHATSA)		IS Standards 10500:2012 Permissible range
	Raw	Final	Raw	Final	Raw	Final	Raw	Final	
Turbidity NTU	1.5-8.2	0.55-5.0	1.8-10	0.90-4.3	2.0-41	0.32-2.0	3-330	0.11-4.8	1-5
pH	6.90-9.35	6.60-7.50	7.15-8.90	7.10-7.95	7.05-7.45	6.90-7.30	6.8-7.9	6.7-7.7	6.5-8.5
Alkalinity	35-42	32-40	40-51	36-51	35-51	34-49	28-99	26-97	200-600
Chlorides	12-16	14-19	10-17	12-18	10-16	11-18	8-22	10-25	250-1000
T-Hardness	38-52	35-50	46-55	42-52	40-55	27-52	23-88	21-86	200-600
Total Coliform	10-220	0-0	10-200	0-0	0-0	0-0	0-0	0	0
E-Coli	4-150	0-0	3-70	0-0	0-0	0-0	0-0	0	0

Note : lake water is untreated water

Unit :

NTU= Nephelometric Turbidity Unit .

mg/l = milligram per litre

*Bhandup complex raw water denotes Quality of pre-chlorinated water from sources Tansa, Modaksagar (Vaitarna), Middle Vaitarna Upper Vaitarna

Panjarapur raw water denotes Quality of pre-chlorinated water from Bhatsa.

MPN/100 ml = Most Probable Number per 100 ml

Source : This Information is received from Hydraulic Engineer Dept of MCGM





Water is brought to Bhandup Complex by gravity mains originating from Tansa, Vaitarna, Middle Vaitarna & Upper Vaitarna lakes. This water is pre-Chlorinated at Yewai from 25 kms upstream of Bhandup Complex.

Water received at Bhandup Complex is then treated using conventional treatment methods such as pretreatment/filtration/post chlorination and is then distributed through Master Balancing Reservoir (MBR) to consume through pipelines, tunnels, service reservoirs etc.

During all these activities at Bhandup Complex, water samples at each stages of treatment are collected and tested for various parameters. The laboratory at Bhandup Complex is working round the clock for this purpose and quality of final water leaving Bhandup Complex is always maintained with in prescribed limits as per drinking water standards IS 10500:2012. The water quality before and after filtration is given in Table No. 7 along with drinking water standards.

The treated water is stored in the master balancing reservoirs (MBR) namely MBR-I at Bhandup Complex with a capacity of 246 million litres (ML) and MBR-II at Yewai with a capacity of 123 ML. It is further distributed to 27 service reservoirs. The pressure in distribution system is in the range of 1 to 1.5 bars during water supply hours. In 'L, N, S & T' ward, some of the areas are converted into 24X7 supplies under improvement program.

Quality control in water supply:

Laboratory at Bhandup Complex was commissioned in the year 1980. Quality of water is checked for 24 hours as per BIS 10500:2012 for drinking water.

Analysis of water for Physical, Chemical and Bacteriological parameters in order to supply safe potable water as per BIS 10500:2012 to the Mumbai city.

Samples of raw water, clarified water, filtered water and final water are tested per hour as follows.

- 1) Turbidity (NTU) – hourly
- 2) pH – alternate hour
- 3) Residual Chlorine (mg/L) – alternate hour
- 4) Temperature (C) – alternate hour
- 5) Colour (Hazen Unit) – alternate hours.

Jar test is conducted on raw water sample in every shift for prescribing optimum Poly Aluminum Chloride (PAC) dose. Complete analysis of water samples – Raw and final is carried out for Turbidity, pH, Colour, Total Alkalinity, Total Hardness, Calcium Hardness, Chlorides, Suspended solids, Total solids and Manganese, Iron, Aluminum, Dissolved Oxygen and Bacteriological examination for Total coli form and E. coli once in a day.

In water Distribution System to monitor quality of water at 27 Service Reservoir, Water supply zones & at Consumer's end about 351 water samples collected daily. The water samples thus Collected daily by Quality Control section Hydraulic Department and the Disinfectant Sub-Inspector of Health department are submitted to G/north Municipal laboratory at Dadar for testing. The testing report

Table 8 : WARD-WISE % OF UNFIT WATER SAMPLES: 2013 TO 2015

Sr. No.	Ward	% of unfit samples 2013-14	% of unfit samples 2014-15	% of unfit samples 2015-16
1	Reservoir	7	2	3
2	A	7	8	7
3	B	10	8	8
4	C	24	3	2
5	D	10	9	6
6	E	14	7	3
7	F/N	13	4	5
8	F/S	10	9	6
9	G/N	6	2	2
10	G/S	5	2	3
11	H/E	8	3	2
12	H/W	8	4	10
13	K/E	8	1	2
14	K/W	8	3	2
15	L	22	8	4
16	M/E	5	5	5
17	M/W	15	6	5
18	N	18	3	3
19	P/N	10	1	2
20	P/S	21	4	4
21	R/C	10	1	4
22	R/N	9	3	6
23	R/S	7	3	3
24	S	9	3	3
25	T	7	5	13
Mumbai Average		10.8	4.5	4.6

Source: This Information is received from G/N water testing Laboratory of MCGM





of the same are sent through E-mail by laboratory to all respective AEW of 24 Wards, service reservoirs, Quality control dept. and all respective officials for necessary action as required to monitor the quality of water. The Ward wise percentage of Unfit Water Sample from April 2013 to March 2016 is shown in table no. 8

Hydrolic Engineer's Department (O.C. Division):

Under the Hydrolic Engineer's Department a water treatment plant is at Pise Panjrapur where the water from Bhatsa river is treated. To avoid wastage of water (30 to 35 MLD) during treatment process, department of Water Project is planning to build an ETP at Pise Panjrapur.

The water supply through service reservoirs is intermittent. This intermittent water supply is the root cause of contamination due to ingress of foul water during non-supply hours through joints, disconnected connections, tampered mains, faulty fittings, etc. Though adequate care is taken to monitor the water quality at all the points from source to end point at consumer's tap, incidents of contamination do occur. All the catchment areas water sources of Mumbai city are protected from chemical contamination and other pollutants.

The Municipal Laboratory is a Public Health Laboratory Of MCGM. For monitoring the MCGM drinking water supply, daily around 200-250 water samples from 24 wards of Mumbai region are analyzed in the laboratory. In monsoon or in emergency upto 250-300 water samples are analyzed. The analysis is carried out using Membrane Filtration Technique and results are obtained within 24 hours. These results are sent to the Medical Officer (MOH) of 24 wards, DEHO (EPID), AEQC and AEW departments by Email within 24 hours for taking remedial measures on unfit water sample location.

Telescopic rate structure/Installation of water meters:

To encourage the residential consumers, excluding slums, to use reasonable quantity of water, the telescopic rate system is being implemented. As such, it is absolutely essential that all water meters shall be in working condition. Accordingly, the installation of AMR water meters through the reputed agencies is undertaken.

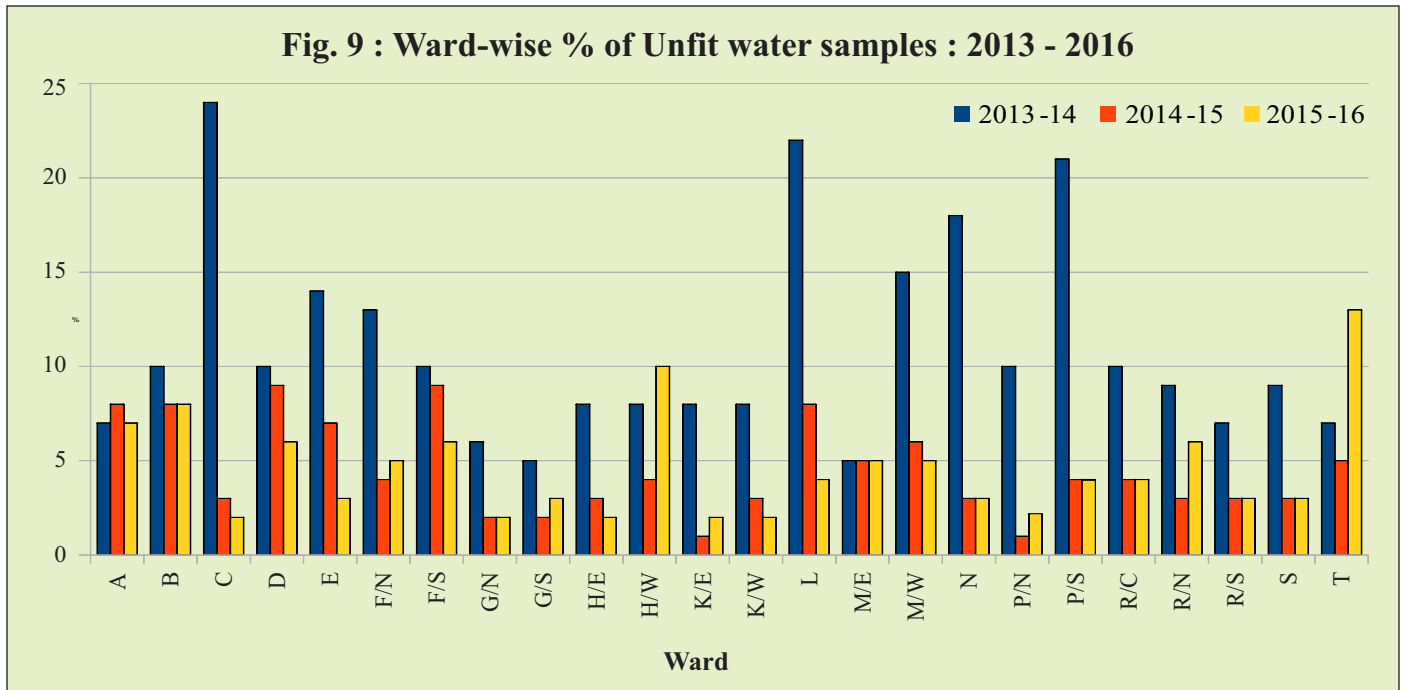
Improvement programme for reducing contamination of water:

In order to reduce leakages and consequent contamination in Greater Mumbai, the tertiary network is being replaced/ rehabilitated wherever necessary. During the year 2015-16, old Distributor Water Mains of 40 km length were replaced by laying new water mains and distributor water mains rehabilitated by internal cement mortar lining of length 28 km due to this contamination has been reduced. Also road department has undertaken massive Road Improvement Programme. Under this programme, the water service connections on roads in Mumbai will be renewed simultaneously along with the roads improvement, due to this in future improvement in supply of water will be increased.

In slum colonies, old and corroded GI pipelines existing in house gullies the work of laying suitable size of water mains on passages of slum colonies and remove bunch of connections, replace pipelines in house gullies with the co-operation of beneficiaries and renew consumer connections are carried out. Such 169 out of 120 works in city, Eastern Suburb and Western Suburb are executed in the year 2015-16. In spite of numerous constraints and limitations, the corporation is successful in supplying regular and adequate quantity of water to the citizens of Mumbai. There are occasions of pipe bursts or power failures when water supply is interrupted. But in all cases water supply is restored in shortest possible time, which rarely exceeds 12-hours, except in case of major burst.

The water demand in year 2016 is expected 4500 MLD and expected to be 5940 MLD by the year 2041. In its efforts to meet the increasing demand, work of Middle Vaitarna project is completed and 455 MLD of water is now available.

Water supply system of Mumbai is also equipped with Supervisory Control and Data Acquisition (SCADA) system. Reservoir levels, inlet-outlet pressure, discharge etc. are monitored by this system. Water



Meter readings are recorded on computer by AEW (Meter Revenue) of every 24 Wards. Then this data is compile by M/s ABM at Worli. After two day this data is converted in PDF Format and forwarded to E. E. Meter (Revenue) and M/s Mail Oder Solution. Then the consumer who has registered there E-mail & Mobile Number are getting copy of water bill on E-mail and SMS on Mobile. M/s Mail Oder Solution has undertaken the work of printing the water bills. Then these printed water bills are packed in envelops and posted to consumers through Indian Post. For Payment of water bills facility are provided through CFC, e-Banking & MCGM's mobile App.

Budget provision for Capital works of the Hydraulic Engineer Department for year 2015-16 was Rs. 871.82cr. and for the year 2016-17 is Rs. 891.93cr.

Water Supply Project

Present status of project of Middle Vaitarna dam and conveyance system:

Middle Vaitarna project is completed and total 455 MLD water is made available in the year 2014 which is of full capacity of dam. Five sub-projects of Middle Vaitarna projects have also completed and Mumbai city receives 455 MLD of water supply from the year 2014.

Budget provision for Capital work for the year 2015-16 was Rs. 990.60Crores while for the year 2016-17 is Rs. 608.90Crores.

Future sources of Water Supply to Mumbai :

Even after commissioning of Middle Vaitarna Project, the gap between demand and supply for the year 2041 is 2840 MLD. To meet the gap and to increase the water supply to Mumbai it is proposed to undertake schemes to develop sources like Gargai and Pinjal for abstracting 440 MLD and 865 MLD of water respectively.

The consultants have been appointed for obtaining various clearances e.g. environmental, forest, biodiversity studies, compensatory afforestation, PAP rehabilitation, land acquisition, environmental impact



assessment etc. The consultant will take all necessary steps to fulfill above requirements pertaining to environmental and forest clearance as carried out during Middle Vaitarna project.

Future allotted sources of water are shown in following Table No. 9

Water Supply Resources- Surface as well as Underground:

The Gargai scheme involves construction of dam on Gargai River and underground tunnel of length 2.5 km for conveyance of water from Gargai dam to Modak sagar reservoir.

In case of Pinjal project, the work of construction of Pinjal Dam would be executed by MCGM. It will also include rest of the works like conveyance through proposed 64 km long tunnel and other allied works like treatment plant, pumping station, storage reservoir etc. This project involves conveyance of water from dam site through under ground tunnel of 64 km length upto Gundavali. Accordingly survey and geological studies are in progress in this regards.

Gargai Project is expected to start by 2016-17 and expected to be completed by 2021-22 and Pinjal project is expected to start by 2016-17 and expected to be completed by 2024-25.

Under 'River Linking Programme', initiated by Government of India; it is proposed to link Damanganga & Pinjal rivers and thereby 1586 MLD water would be made available to MCGM and this water will be conveyed into Pinjal reservoir after its completion. This project will be implemented by joint board of representative of National Water Development Agency (NWDA)/Government of India/Government of Gujarat, Government of Maharashtra & MCGM. Detailed Project Report of this project is completed and furnished with Central Water Commission (CWC) for scrutiny.

Ongoing & recently completed projects in support for improvement in water conveyance system:

Alternatives to age old water mains in terms of safety, enhancement in conveyance system and to increase its capacity.

1. Gundavali to Bhandup Complex tunnel (15.1 km long X 5500 mm dia.) and the same work is in progress in two stages. The work of excavation of tunnel boring from Gundavali to Kapurbawdi and Kapurbawdi to Bhandup Complex is completed and work of reinforced cement concrete lining is in progress. The physical progress of work from Gundavali to Kapurbawdi is 90% completed and from Kapurbawdi to Bhandup Complex is 78% completed.
2. Maroshi to Ruparel College 3000 mm dia. and 11.85 km long tunnel work was commissioned and other related miscellaneous work is completed.
3. Tunnels from Powai to Ghatkopar low & high level reservoirs and Powai to Veravali reservoirs for replacement old water pipe line and better distribution of water supply. The work of excavation of 2.2 km. long tunnel from Powai to Veravali is completed and balance work of a) Construction of shaft at Ghatkopar High Level Reservoir / Low Level Reservoir is in progress, b) The work of excavation of tunnel from Powai to Ghatkopar is in progress manually instead of TBM. The Tunnel work will likely to be completed by 31 March 2017.
4. Demolition and Reconstruction of Worli Hill reservoir (21.25ml capacity) work is completed on 31 Oct. 2015.

**Table 9
FUTURE SOURCES OF WATER SUPPLY**

Sources	Yield in MLD	Ownership	Expected year of completion
Gargai	440	MCGM	2021-22
Pinjal	865	MCGM	2024-25
Damanganga	1586	GoM	To be decided by GoM/GoI
TOTAL	2891		

Source: This information is received from HE dept of MCGM



5. Construction of effluent treatment plant at Panjrapur for treating backwash water (65 MLD) generated after washing filters from existing Water Treatment Plants thereby making it suitable for reuse. The physical completion of work is 67%.
6. Providing and laying proposed pipe line from Bhandup Complex Tunnel shaft to water treatment plant at BPT. The work is in progress and likely to be completed by 15 December 2016.
7. Re-engineering of 90 MLD Vihar water treatment plant. The work is in progress and likely to be completed by 29.05.2019.
8. Laying of 1200 mm.dia. pipeline from Adarsh Nagar to J.P. Road, Andheri (W). The work is in progress and likely to complete by 15.02.2017. Reinstatement of above work is in progress and likely to complete by 02.05.2017

Proposed projects to be undertaken:

(I) Proposed tunnel:

1. Tunnel from Amar Mahal to Trombay reservoir – 5.5 Km.
2. Tunnel from Amar Mahal to Wadala to Parel – 9.66 Km.
 - M/s Tata Consulting Engineers Ltd. are appointed as consultant for above tunnels. Feasibility studies and tender preparation are in progress by M/s TCE Ltd. Feasibility studies are held up for permission from BEST as well as BARC/ DAE. The said studies can be completed after receipt of above permission and then tendering procedure can be commenced.
 - After getting permission from BEST, feasibility report has been prepared by consultants M/s.TCE. Work of preparation of tender documents is in progress.

(II) Proposed works:

1. Laying of 2235 mm dia single main across NH-3 by micro tunneling/Jacking pushing – 0.16 Km.
2. Providing & Laying 3000 mm dia missing link of Middle Vaitarna Main between Chinchvali – ARVC – Yewai with flow control Valves at ARVC & mortar lining work – 4 Km.
3. Replacement of Twin Tansa Mains (1800 mm dia) to be replaced by single 3000 mm dia main between Balkum to Saddle Tunnel – 10 Km.
4. Mortar Lining of Upper Vaitarna Main from Aghai to Gundavali – 44 Km.
5. Mortar Lining of Vaitarna Main from Yewai to Gundavali – 11 Km.
6. Mortar Lining of Vaitarna Main from Gundavali to Saddle Tunnel after commissioning of Gundavali – Bhandup Tunnel – 18 Km.
7. Inspection and repair of 2950 mm dia old tunnel from Modak sagar to Bifuraction chamber – 7 Km.
8. Design, Supply, Installation, Testing & Commissioning of 7 Nos. of existing Stage-II Pump with motors & H. T. panels at Pise Pumping Station.
9. Replacement of Stage-I Main Transformer 100KV/3.3KV, 7.5MVA capacity at Pise Switchyard.
10. Design, Supply, Installation, Testing & Commissioning of 7 Nos. of existing Stage-II Pump with motors & H. T. panels at Panjrapur Pumping Station.
11. Inspection and conditional survey of intake tower & transmission tunnel up to Bell Nallah at Modak Sagar.
12. Feasibility study for stopping of ingress of sewage in Powai lake & beautification of Powai lake.
13. Construction of storage structure at 100KV Sub Station & Pumping Station of Mumbai-III A.





14. Structural repairs to Master Balancing Reservoir (MBR) at Yewai Panjrapur – 116.50 ML.
15. Construction of new administrative office building at Pise.
16. Structural repairs to Reservoirs in City area
 - a) Bhandarwada Reservoir – 7850 ML
 - b) Malbar Hill Reservoir – 148 ML
17. Structural repairs to Reservoirs in W/Sub.
 - a) Verawali High Level Reservoir – 4.50 ML
 - b) Malad Hill Reservoir – I – 49.50 ML
18. Structural repairs to Reservoirs in E/Sub.
 - a) Ghatkopar High Level Reservoir – 31.00 ML
 - b) Trombay Low Level Reservoir – 27.00 ML
 - c) Bhandup Complex (MBR) – 248.00 ML
19. Renovation/Modification of Vihar, Tulsi, Powai Dams as per the suggestion by Dam Safety Organization.

Even after commissioning of Middle Vaitarna Project, the gap between demand and supply for the year 2041 is 2840 MLD. To meet the gap and to increase the water supply to Mumbai it is proposed to undertake schemes to develop sources like Gargai and Pinjal

Rain Water Harvesting in Mumbai

MCGM supplies 3750 million liters of water every day, against a demand of 4505 million liters per day to the Mumbai, the economic capital of our country. The purity of the water supplied to the citizens of Mumbai is very high on the “International Quality Standards Rating” and considerable expenditure is incurred for this purification. Unfortunately this water is being used for all secondary requirements also such as, flushing of latrines and washing of vehicles. In view of the indiscriminately rising population and comparatively limited resources there is an urgent need to search ways to save water and to put those to actual use. MCGM may not be able to supply water for secondary requirements such as flushing, gardening, vehicle washing swimming pools, air conditioning etc. and it is expected that Citizens have to generate the water for secondary requirements through rain water harvesting or recycling.

Rain Water Harvesting (RWH) is an ancient and convenient method. It implies storage of rainwater in manmade tanks or recharging ground water and utilization as per requirements. Since, rainwater within our own compound is to be stored; anybody is entitled to do so. Most importantly, the capital expenditure and maintenance cost involved in this method is quite low. Rain Water Harvesting contributes in raising the ground water level, the quality of the ground water improves, soil erosion is arrested. Entry of seawater in ground water can be prevented.

Following methods can be deployed for Rain Water Harvesting.

- 1) Storage in underground or above ground artificial tanks.
- 2) Direct recharging of the subsoil water strata (aquifer) through dug up wells or bore wells.
- 3) Recharging of the subsoil water by percolation.
- 4) Forcing rainwater in the ground through bore wells and thereby preventing entry of salty seawater in the subsoil strata.





Very large quantities of water can be stored because of the large roof areas of industrial buildings. Those who buy water in tankers can save on their expense by using rainwater. House owners or tenants can store rainwater with a little bit of effort. MCGM is making all efforts to actually practice Rain Water Harvesting/ water conservation.

Municipal Corporation of Greater Mumbai is the first Municipal Corporation in Maharashtra to make Rain Water Harvesting Mandatory. Rain Water harvesting has been made mandatory to new properties coming for development from 1st Oct. 2002 and having plot area 1000 sq.mt and more. These conditions were extended to the properties which had come for development prior to 1st Oct. 2002 but are coming for occupation/ completion from 01.09.2003. As per Government directives u/no.TPB-4307/396/CR-124/2007/UD-11 dtd. 06.06.2007 the condition is binding to all developments having plot area more than 300sq.mt and more. The condition is applicable to the properties coming for addition alteration/use of balance FSI etc. The condition is imposed as one of the Intimation of Disapproval (IOD) conditions for installation of RWH scheme and occupation certificate is granted only after compliance of the same. Recycling is also mandatory to centrally air-conditioned buildings to meet their chilling requirement.

Mumbai receives an average of 2000 mm of rainfall. Considering 458.53 Sq.km. area of Mumbai the rain water falling in city works to approximately 2394 MLD. Even if 20% of this is saved and put to use at the rate 479 MLD of Municipal water can be saved.

As rain water harvesting was not being practiced in city prior to Oct. 2002 there was absolute ignorance amongst citizens including professionals like – Architects, Plumbers, Builders, Developers etc. In order to provide proper guidance to all and set up examples, MCGM Formulated a technical cell – “Rain Water Harvesting cell” in Nov. 2002 headed by Asst. Engineer, (Rain Water Harvesting) Cell. The cell organized first 2 days technical seminar with A.I.I.L.S.G. and I.W.W.A. on 28th Feb./ 1st Mar. 2003. The seminar comprised of 17 lectures and the 130 participants were apprised of various aspects of Rain Water Harvesting. The cell has participated in most of the major seminars in Mumbai & conducted many awareness programmes to appraise various section of society. To involve citizens, essay competition on “My way of Water Conservation” was organized in July 2003 in four group and four languages. An information booklet on “Rain Water Harvesting and Water Conservation” was released in its prize distribution ceremony by Hon. Mayor of Mumbai. The booklet is appreciated even by Government of Maharashtra & circulated to many Municipal Corporations/Councils. Municipal Calendar 2004 was dedicated to Rain Water Harvesting so that the message is conveyed to people at large. Drawing competition for Municipal school children was also conducted in Jan./Feb. 2004 to create awareness amongst teachers, students and their parents. NSS students are involved in awareness campaigns to reach more citizens. Since 2005, awareness campaign is conducted from 22nd March to draw specific attention of citizens. Techniques like “Jalmelas” in each Administrative Ward & open grounds, training Ward staff for spreading basic information, painting BEST buses, relaying messages through TV sets, on Railway Stations, in BEST buses & private premises, putting message on Municipal bills, advertisement hoardings at prominent locations, informative documentaries in CST subway are being adopted to reach masses. NGOs are also involved in this activity. TV channels & FM radios are also being used for communicating message. As a part of awareness campaign MCGM has published school books series titled प. . . . पाण्याचा on water conservation & rain water harvesting for Std. I to X, in Marathi in 2012 & distributed it to each Municipal Marathi medium school students. Moreover, another activity titled 'Aji Ajobanche bole' has been introduced to rope in senior citizens in this campaign. It is expected that senior citizens would use their energy in convincing people in their nearby locality to save water. They would also interact with school children and even read out books to them & explain the ideas incorporated thereat.

In view of the late monsoon in the year 2015, RWH & Water Conservation Cell has started “Save Water Awareness Campaign” to spread awareness amongst the citizen of Mumbai. As a part of the campaign,





advertisements in local newspapers were published appealing Mumbaikars to use water judiciously and to avoid wastage of water. Save water awareness posters, short videos were prepared with the help of Tata Trust. Save Water appeals/advertisements were also displayed on TV, in BEST buses & in local trains. Lectures on water conservation in various Municipal schools via virtual classroom were delivered through Marathi Vidnyan Parishad. A yearlong initiatives “Water smart Mumbaikers – mass awareness for water conservation” has been initiated by “me 2 green” NGO with MCGM as concept partner.

As an awareness initiative amongst the citizen and to understand the RWH scheme, the Municipal Corporation had set up number of pilot RWH schemes which include projects in Godrej Soaps and Housing Colony, Nirmala Niketan, Tata Institute of Social Science, Sane Guruji Udyan & many other in the existing buildings with joint initiative, MC's bungalow, Mayor's bungalow, CTIRC, Bhagwati Hospital, Marol Fire Brigade, Santacruz Transport Garage, M-ward office building, Kasturba Hospital, Cement Go-down Building, Five Gardens & Malad Transport Garage with own resources. Proposals for many Municipal establishments are in process. There is a target to set up least one pilot project in each Municipal Wards.

There are in all 17993 identified wells (6559 dug up wells, 10807 tube wells & 627 Ring wells) in Mumbai. Assuming average per day water withdrawal of appx. 20,000 lit. (two tanker load) per well, it can be safely presumed that 359 MLD of ground water is being extracted every day in Mumbai.

Wells are known sources of ground water & can act as line of defense in case of emergency. Fire engines have to travel considerable distance for filling water before attending fire spot. Filling points are being set up on Municipal wells for fire Bridge to save fuel & precious time during emergencies.

Protecting wells in the city is very important considering future water crisis. RWH Cell with the help of staff of Insecticide Officer has prepared list of wells & bore wells in each locality and identified the danger zones from ground water extraction considerations. MCGM has also prohibited unauthorized burying of existing wells from Jan. 2003. The A.E. (B and F), A.E. (B. P.) as the case may be required to take action under sec. 53(1) of MRTP Act in case of unauthorized filling up of wells.

In order to study the effects of ground water extraction, MCGM has taken up pilot Impact Analysis Studies in 'M/E' and 'P/S' wards with the help of GSDA, Pune.

MCGM has decided to preserve existing ponds & a policy for the same is being formulated involving MMRDA, NEERI & NGOs.

Thus the Corporation makes efforts in all directions to support Rain Water Harvesting, which is one of the Best Management Practices (BMP) of MCGM. It is the duty of all citizens to contribute their own efforts to this cause to help themselves.

Mumbai receives an average of 2000 mm of rainfall. Considering 458.53 Sq.km. area of Mumbai the rain water falling in city works to approximately 2394 MLD. Even if 20% of this is saved and put to use at the rate 479 MLD of Municipal water can be saved.

SEWAGE DISPOSAL

It is an obligatory duty of MCGM to provide sanitation and waste water disposal facilities to the citizens of Mumbai. Proper and safe sewage disposal is essential, as 80% of diseases in India are caused by water borne pathogens. In addition to the health problems, inadequate sewage disposal causes severe environmental degradation.

Laboratory at Dadar under Sewerage Operation department has carried out monitoring of coastal water at Colaba, Worli and Bandra (Table 10). Based on the report of the same in comparison with SWII Standards it has been found that at Colaba, Bandra and Worli, levels of pH are around the prescribed standards while Turbidity and B.O.D. levels are below the standards. D.O. levels are exceeding standards which is a good sign in terms of



Table No. 10 : Coastal Sea water quality of Mumbai 2015-2016

Place	PH		DO (in ppm)		Turbidity (in NTU)		MPN (No./100ml)		E-Coli (No./100ml)		BOD (in ppm)	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Colaba	7.5	7.9	4.4	7.9	12	28	15	240	5	90	0.6	2.1
Bandra	7.6	7.9	5.0	6.9	3.5	15	10	550	9	130	1.1	3.0
Worli	7.5	7.9	4.7	6.4	3.7	17	27	800	4	320	1.4	2.7
Standard: SW-II	6.5-8.5		4 mg/l		30 NTU		100/100 ml				3 mg/l	

DO: Dissolved Oxygen

BOD : Biological Oxygen Demand

MPN : Most Probable Number

Source: This information is received from SO laboratory of MCGM

dissolved Oxygen. MPN is exceeding standards at all sites. Levels of e-coli are exceeding at all site (except Colaba).

Sewerage disposal work is carried out by three departments in following ways,

1. Sewerage Projects (SP) department looks after the work of sewer planning, laying new sewers, upsizing the existing sewers and elimination of missing links in existing sewer.
2. The Sewerage Operation (SO) Section maintains the sewer lines to keep them in working condition.
3. Mumbai Sewerage Disposal Project (MSDP) carries out the sewerage treatment and disposal work. MSDP along with concern Ward office also looks after the work of providing toilets in the slum area. (Temporary mobile toilets during public functions are provided by Solid Waste Management department).

The sewage generated in the MCGM limit is collected through network of various small and big size sewers, treated and disposed off. In 2011, Consultants M/s Mott McDonald and M/s R.V. Anderson had prepared detailed report for Mumbai Sewerage Disposal Project, considering the probable population of Mumbai in 2025.

The work of information regarding network of sewer lines in the form of printed records is nearly 90% completed by Geographic information system. The precision of this work is in process to bring level less than 1 meter. For this purpose MCGM is purchasing 25 D.G.P.S. rolling rovers.

It is proposed for the information of systematic cleaning work of sewer lines should be uploaded on sewer line map for central control. Similarly information regarding repair work of sewer lines will be uploaded on G.I.S.

It is proposed that various pumping stations of this department will be online controlled with the help of SCADA system. This system will be commissioned in the next financial year.

The work of information regarding network of sewer lines in the form of printed records is nearly 90% completed by Geographic Information System.

Mumbai Sewerage Disposal Project :

Mumbai known as the commercial capital of India and attracts millions of people for their better livelihood. The population of greater Mumbai has increased from 9.9 million in 1991 to 12.64 million in 2011.

Municipal Corporation of Greater Mumbai has to extend infrastructure facilities such as water supply, waste water collection treatment, Solid Waste Management etc. in order to cover basic civic needs of the ever-





increasing urban population.

The waste water collection and treatment facilities were provided since, 1980 and were extended with growth of the city.

The first sewerage master plan came up in 1979 and the water collection and treatment facilities were further developed. The waste water collection & treatment facilities for the city are grouped in seven service zones viz. Colaba, Lovegrove, Bandra, Versova, Malad, Bhandup & Ghatkopar. Under MSDP-I which was completed in 2003, aerated lagoons were constructed at Versova, Bhandup & Ghatkopar and Marine outfalls were implemented at Colaba, Lovegrove & Bandra locations. The decision for Malad service zone was kept in abeyance due to sensitive issues of mangroves.

At present sewerage infrastructure consist of 1636 km of sewers, 25 pumping stations, preliminary treatment facilities and Marine outfalls at 3 location, 3 Stage lagoons at one place and single stage lagoons at two places.

Issues remarks for new sewer connections, septic tank and STP for the Government, Semi-government, private property and bungalows, etc. While implementing development project of area above 20,000 sq.m as per MoEF guidelines, it is mandatory to provide STP for the lay-out. The proposals for the STPs are scrutinized and permissions for the same are granted after receipt of the NOC from the Environment Department of Government of Maharashtra.

The work of marine outfalls at Colaba and Worli was completed in the year 1988 and 1999 respectively. The Worli outfall system consists of RCC lined tunnel outfall of 3.5 meter internal diameter and 3.4 km length. This is constructed at Lovegrove in Worli. The outfall-line passes at about 65 meters below the ground level and about 53 meters below the seabed. The sewage flows through this tunnel and disperses into the seawater through the risers at the end of the tunnel. A preliminary treatment and aerated de-gritting is imparted to the sewage before it is let into the tunnel. The work of 3.7 km. long and 3.5 meters diameter tunnel was completed at Bandra and the Bandra outfall system was commissioned in May 2003. The aerated lagoon at Versova with capacity of 90 MLD was commissioned in 1996. The aerated lagoons at Bhandup with 280 MLD capacity and at Ghatkopar with 300 MLD capacity were commissioned in June 2002 & May 2003 respectively. The BOD levels minimises 75% to 90% within 1½ day. The effluent is discharged into adjacent Thane creek.

Earlier there existed only Effluent Standards for discharge of effluent into marine coastal areas under Environmental (Protection) Act 1986. There were Water Quality Criteria for coastal waters as published by Central Pollution Control Board (CPCB) in 1993. Accordingly, Ministry of Environment & Forests, Government of India issued a notification under No. GSR 7 dated 22nd December 1998 regarding Water Quality Standards for coastal water marine outfalls.

The sewage disposal arrangement of Mumbai City is divided into seven zones viz. Colaba, Worli, Bandra, Versova, Malad, Bhandup & Ghatkopar. The sewer line leading to pumping stations & sewerage treatment plan are lead by this department by Open cut and Trenchless method. The planning, designing & e-tendering of new sewer lines where sewer lines are not existing and upsizing of existing sewer lines as per requirement is done by dy.Ch.E.(SP) P and D section.

Sewer project (Planning and Design) department offer remarks for street connections, Septic Tanks and the plots belonging to Govt., Semi Govt., Private Properties & Bungalows etc.

The execution of laying new/ upsize sewer line works as per tender conditions is done under Dy. Ch. E. (SP) Construction. Both above sections are under control of Ch.E.(SP).



**Projects Proposed in Financial year 2016-2017 :**

In financial year 2016-2017, budget provisions of Rs. 198.33 Cr. is proposed, for laying new sewer lines in unsewered area and upsizing of existing sewer line in City, Eastern and Western suburbs whenever required. The major works are as under:-

H/West Ward :

The work of providing & laying new sewer line at Kadeshwari, Pinglewadi Road, Bandra (West) are proposed and after completion of said sewer lines works the sewage disposal facility will be available to this area.

K/East Ward :

It is proposed to lay 1000 mm dia. sewer line on Sahar Road upto Sahar Cargo, Andheri (East) by Micro Tunneling Method and after completion of this work the sewerage disposal facility will be available to this area.

P/North Wards :

The work order is issued for the work of providing & laying sewer line in phase-I by Micro tunneling method on Rani Sati Marg, Malad (E). The work is expected to start in Oct. 2016. On completion of this work, the work of laying sewer line at Pathanwadi will be proposed under phase-II. On completion of phase-I & phase-II works the area of Pathanwadi, Malad (E) will be sewerred.

T- Ward :

It is proposed to lay new sewer line along Marathon Avenue Road, Mulund (W), where at present there is no sewer line. On completion of this sewer line work, Sewage disposal facility will be made available to this developed area.

Review of proposed works in year 2015-16 is as follows :

In Financial year 2015-16, sewer line works of Rs. 173.18 cr. were proposed and out of which works of Rs. 138.90 cr. are completed. The present status of works proposed in 2015-16 are as under

R/North Ward :

It is proposed to provide & lay sewer line at S.N. Dubey Marg, Sant Mirabai Marg & Rawalpada in Dahisar (East), e-tender for the same was invited. However, as the bids received are on higher side, tender for the same is being re-invited.

M/West Ward:-

It is proposed to provide & lay sewer lines in collector colony, Chembur for carrying of sewerage generated from this area to nearby sewer network in Stage-I & Stage-II. Accordingly tender process for stage – I is completed and the work will be started from Oct. 2016.

K/East Ward :

It is proposed to provide and lay new sewer line of 65 mtr length at Jiva Mahale Road in K/E ward, in place of non-functioning existing sewer line.

E-tender for the said work was invited. However, as the bids received are on very higher rate, the said work is proposed to be carried out by micro tunneling method.

M/East :

Submersible sewerage pumping station at Deonar Village road is put into operation & properties in the area are being connected to existing sewer line on Deonar Village road through Asstt. Commissioner M/East ward & E.E. (S.O.) E.S.

MCGM implements Integrated Water Supply and Sewerage Schemes with the assistance from “International Development Bank” for Reconstruction and Development for more than two decades. In 1972, the Corporation for the first time initiated preparation of a baseline plan for water supply and sewerage disposal.



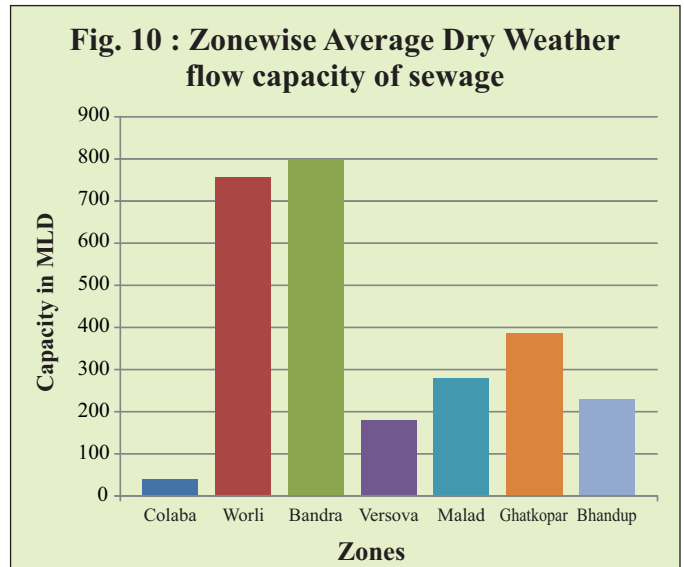


As per this baseline plan, the configuration of the “Greater Mumbai Sewage System” was appropriately planned and divided into seven natural drainages or service areas viz. Colaba, Worli, Bandra, Versova, Malad, Ghatkopar and Bhandup (Table 11). Each of the 7 zones has terminal sewage pumping station. Pumping stations at Colaba, Worli and Bandra have primary treatment facility after which the sewage is discharged in Arabian Sea through Marine Outfalls whereas sewage from Malad is discharged into the Malad creek after primary treatment. The terminal pumping stations at Versova, Bhandup and Ghatkopar have lagoons to provide secondary treatment after which they are released into creeks of Malad (Versova) and Thane.

Table 11 : ZONEWISE AVERAGE DRY WEATHER FLOW CAPACITY OF SEWAGE

Sr. No.	Zone	Zonewise Sewage Flow capacity in MLD
1	Colaba	41.10
2	Worli	756.90
3	Bandra	796.80
4	Versova	180.00
5	Malad	280.40
6	Ghatkopar	386.10
7	Bhandup	230.00
	Total	2671.30

Source: This Information is received from MSDP dept of MCGM



Objective :

The 1979 Master plan was updated by MCGM in 2002 by carrying out MSDP Stage –II feasibility study Master plan. The broad goal of the MSDP Stage II master plan is to provide a healthier and improved environment for people living in the city, while minimizing the impact of waste water on the natural environment. This will be achieved by increasing the quality and reliability of waste water collection, treatment & disposal using affordable and sustainable technologies over the duration of the planning period up to year 2031.

The priority works under MSDP, Stage II include expansion of sewage pumping stations, sewage pumping mains, waste water treatment facilities, transfer tunnels, outfall shafts, outfall tunnel and diffusers.

Environmental Aspects:

Since, most the development works for pumping treatment and disposal of sewage are located in the coastal areas, which fall under Coastal Regulation Zone (CRZ) I or II environmental impact assessment of such projects are mandatory.

National Environmental Engineering Research Institute (NEERI) has carried out a study on Comprehensive Environment Impact Assessment for MSDP Stage II Priority works, based on which the STP upgradation project are being considered for implementation.

Direction of Pollution Control Boards:

The Municipal Corporation of Greater Mumbai is also required to ensure that treated effluents meet the prescribed in the consent granted by State Pollution Control Board. MPCB by their consent 2015 allowed upgradation with the norms of 100/100 mg/l BOD/SS for disposal through Marine Outfall and 20/30 mg/l BOD/SS for disposal into the creek and allowed additional time to upgrade STPs at Bhandup, Ghatkoper, Versova and Malad, 2019 to achieve further stringent standards 20/30 mg/l BOD/SS.





In the meantime, the CPCB has issued directives to the MCGM in their letter dated 9th October 2015 under section 5 of EP Act 1986 to ensure that STPs of adequate capacity are provided for complete treatment of the sewage generated and also to ensure that the treated effluents shall meet the standards of BOD/TSS of 10/10 mg/ltr within a period of 5 years from the date of notification.

Action Plan for Upgradation of STPs:

Since the directives of the CPCB are binding on the local body it would be necessary to take the same into account while planning all future projects and accordingly MCGM has already initiated action for upgradation of the STPs to meet the norms prescribed by CPCB within the period of five years as tabulated below.

Table No. 12 : Waste Water treatment & proposal treatment centre

Sr. No.	Waste Water Treatment Facility Zone	Flow of STP in MLD (Proposed)	Proposed Treatment
1	Colaba	37	Preliminary Treatment, Primary, Secondary and Tertiary Treatment with Recycle and Reuse facilities
2	Worli	493	
3	Bandra + Dharavi	826	
4	Versova	225	
5	Malad	847	
6	Bhandup - Phase I	323	
7	Ghatkoper - Phase I	506	

Benefits of implementation of MSDP :

1. Disposal of sewage through outfalls has considerably reduced the existing pollution levels in nallahs, creek and Arabian sea.
2. In the long run, better coastal water quality lead to improved marine and fish yield thereby benefiting fishing communities.
3. The direct physical benefits of the project has come from removing domestic sewage and industrial waste from the inner city's natural water courses, surface water drains, shore line and beaches, thus improving the living conditions of the urban population. This has reduced health risks, offensive odour as well as improved city's visual and aesthetic environment.
4. The slum sanitation schemes have improved the sanitation facilities in the slums, which has resulted into health and hygienic benefits to the slum dwellers apart from general improvement in the environmental conditions and reduced the risk of epidemic diseases.
5. Legal compliance of environment standards as laid down by CPCB would result in safe water at the beaches for water sports and swimming.

The sewage master plan prepared in 1979 by Metcalf and Eddy inc. had formed the basis for the conveyance & disposal of sewage in Greater Mumbai area up to year 2031. MCGM has updated the 1979 plan, which had served the city well, in 2002 by carrying out stage-II feasibility study. Master plan under MSDP-I more accurately reflects the future needs in terms of additional treatment & disposal facilities for the projected population in the year 2031, water supply rise, wastewater discharge standards & the environmental conditions.

MCGM had appointed M/s. Mott MacDonald/R.V. Andersons Associates Ltd. (Mott/RVA) to carry out MSDP Stage-II feasibility studies in September 1999. The scope of the feasibility study covered recommendations on sewage treatment options, planning for additional works necessary to meet the future environmental standards, determine operational and management requirements and training for adequate technology transfer. The consultants have recommended master plan for the period from 2005 to 2031 with an expenditure amounting to Rs.10,600 crores (year 2010 base) to be implemented in five phases, including slum sanitation.



The broad goal of the MSDP master plan is to provide a healthier and improved environment for people living in the city, while minimizing the impact of wastewater on the natural environment. This will be achieved by increasing the quality and reliability of wastewater collection, treatment and disposal using affordable and sustainable technologies over the duration of the planning period up to year 2031.

The master plan proposals include a number of physical components.

1. Slum sanitation: toilet blocks, individual toilets, sewer connections, drainage
2. Sewerage collection system, rehabilitation and reinforcement (upsizing)
3. Area sewer collection system extension, connection of septic tanks and unconnected households.
4. Removing illegal connections, dealing with foul connections at the storm system, inter connections between storm and foul systems.
5. Pumping stations rehabilitation, extension of sewer lines and building of new pumping stations and sewer lines and treatment work.
6. Transfer system including tunnels and trunk sewers.
7. Disposal of treated effluent: Erangal outfall

The sewage that may not be collected through sewerage network including from septic tanks of informal housing and unsewered area passes through open drains into discharge points will be diverted into sewage network to sewage treatment plant.

Sewage water generated in Mumbai is treated and then discharge into the sea. The report of quality of sea water on west coast will be submitted by NEERI as per standards prescribed by Central Pollution Control Board.

Slum Sanitation Programme (SSP):

More than 60% of the population of Mumbai lives in slums. The creeks and coastlines are deteriorated mainly because of non-availability of sanitation facilities to slum dwellers, which results in open defecation and waste water discharges. A slum sanitation programme is therefore included in MSDP as an integral part of project with funding from World Bank. It is a demand driven participative community programme to provide sustainable sanitation facilities to several individual slums, which occupy municipal land. The programme was launched in 1997.

Provision of adequate Toilet blocks would contribute to the well being of the city population, providing respite to old people and labor force especially the women. Based on the internal data assessment, RDDP has accounted for existing, proposed and under construction Toilet blocks as on March 2016, and proposed future provisions upto 2019. Additionally, the DCR provisions propose 50% toilet units to add floors to the existing ground floor structures to tap the full potential of the existing Toilet block plots. The table gives provision details made in the Island city, Eastern Suburbs and Western Suburbs.

Sr. No.		Female	Male
1	Urban	3232	5684
2	Eastern Suburbs	1850	2978
3	Western Suburbs	2506	3802

STORM WATER DRAINAGE SYSTEM

Mumbai is lined on the west by Arabian Sea and intercepted by number of creeks. The tidal variation is a major concern in the system of storm water drains (SWD) to release rainwater as well as wastewater into sea. The present SWD system in the city area is more than 100 years old and about 525 km long. This network consists of underground drains, laterals and water entrances built on the basis of area and weather conditions. The old SWD system is capable of handling rain intensity of 25 mm per hour at low tide with runoff coefficient





of 0.50. If the rain intensity exceeds more than 25 mm per hour during high tide, there is always possibility of water logging in low lying areas of the city.

In practice however, in addition to storm water, they also carry sewage overflow from septic tank, surface water, etc. Length of open SWD in Mumbai is about 1987 km. The flow from the open SWD is discharged either into nallas, culvert, creek or sea. This open SWD becomes an eyesore due to throwing of garbage by citizens especially in slum area and creates unhygienic conditions. Therefore, desilting is carried out through registered contractual agencies throughout the year.

There are 85 major out-falls in the city area which drain to Arabian sea directly, 8 at Mahim creek and 12 at Mahul creek. There are 29 out-falls in western suburbs draining directly into Arabian sea while 14 drain into Mithi river which ultimately joins Mahim creek. In eastern suburbs, 14 out-falls discharge in Thane creek, while 6 discharge in Mahul creek and 8 into Mithi river. In suburbs and extended suburbs area, open SWD are constructed on both sides of road.

Heavy rain in Mumbai city in June 1985 had resulted into flood like situation, which paralyzed the roads and railway traffic and there was heavy economic loss. In view of this, corporation decided to carry out the study of the storm water drainage system of the city. A master project was planned to help to drain out Storm Water immediately and reduce floods. In the year 1989 M/s Watson Hawksley International Pvt. Ltd. and their Indian sister concern M/s AIC was appointed as a consultant for this project. The consultants had inspected existing storm water drainage system and nallas, identified 121 catchments areas of the city and studied the deficiencies in cleaning and maintenance. They have also studied the preparation of map and its scale again. In year 1993, to improve the storm water drainage system, they prepared a master plan, which is known as BRIMSTOWAD Master Plan. This plan suggested improvements in SWD system with design criteria, of rainfall intensity of 50 mm/hr with runoff coefficient of 1.00

As per the price index of the year 1992, total cost of the project was worked out to Rs.616.30 crores. It was proposed to carry out improvements in the time span of 12 years. However, due to the shortage of funds and other reasons, only the works amounting to Rs.260 crores were completed. As per the price index of year 2006, total cost of remaining work is approximately Rs.1200 crores. As it was not possible to complete these balance work with the budget provision of Municipal Corporation of Greater Mumbai within stipulated period, Government of Maharashtra/ Government of India had been requested for financial assistance.

The Government of India sanctioned a special grant of Rs.1200 crores as per detailed project report submitted to Government of India for implement BRIMSTOWAD Project in year 2007. Out of these, MCGM has received Rs. 1000 crores till date.

Funds received from Government of India are as follows.

Sr. No.	Date	Amount Received
01	23.08.2007	Rs. 400cr.
02	17.02.2009	Rs. 100cr.
03	31.03.2010	Rs. 400cr.
04	31.03.2010	Rs. 100cr.
	Total	Rs. 1000cr.

In the year 2005 Mumbai faced unprecedented rains on 26th & 27th July and 944mm rainfall was recorded in one day. This resulted in the flooding; therefore, Government of Maharashtra had appointed a Fact Finding Committee (FFC) to analyze the factors responsible for the situation and to suggest remedial measures so as to avoid such calamities in future. Based on the BRIMSTOWAD Master Plan and the recommendations of Fact





Finding Committee, the balance BRIMSTOWAD works for the improvement to the storm water drainage system were undertaken. As per the suggestion of fact finding committee BRIMSTOWAD report is to be reviewed and upgraded for which MCGM has appointed M/s. MWH (I) Pvt. Ltd. as a consultant. The master plan is under preparation by the said consultant.

Brimstowad project is proposed to be implemented in 2 phases. There are 20 works in Phase-I and 38 works in Phase-II. The scope of the BRIMSTOWAD project is as under.

1. Rehabilitation and augmentation of underground drains in city.
2. Construction of new drains in RCC.
3. Training of nallhas in RCC M-40.
4. Widening and deepening of nallhas.
5. Construction of access road along the nallha.
6. Construction of Storm Water Pumping Stations.

Table No. 13 : Present status of the BRIMSTOWAD Project

Details	Phase I				Phase II			
	City	W. S.	E. S.	Total	City	W. S.	E. S.	Total
No. of the works	5	7	8	20	16	10	12	38
No. of completed works	4	6	6	16	10	1	2	13
No. of the works in progress	1	1	2	4	5	9	9	23
Tenders yet to be invited	0	0	0	0	1	0	1	2

Source: This information is received from Storm Water Drain Dept of MCGM

Table No. 14 : Status of Pumping Stations in BRIMSTOWAD

Sr. No.	Pumping Station	Status
1	Haji Ali and Irla	Completed and commissioned in the month of May 2011
2	Cleaveland Lovegrove	Completed and commissioned in the month of May 2015.
3	Britannia	Construction work in progress. Expected to be completed by May 2016
4	Gazdarbund	Construction work recently started. Expected to be completed by November 2016
5	Mogra & Mahul	Land acquisition in progress

Source: This information is received from Storm Water Drain Dept of MCGM

Total expenditure incurred till Feb 2015 is Rs. 2007.78cr. However, due to increased width and depth of the drains due to change in design parameters, requirement of unconventional technology specially in tidal zone and passage of time – particularly due to encroachment issues, total financial requirement of the project has seen a substantial rise and additional funds to the extent of Rs. 2700cr are required for which revised DPR is submitted to Government of India on 12.03.2012.

Environmental Aspect :

As regards cleaning and desilting of nallas, the same is carried out every year, prior to monsoon within MCGM jurisdiction. The same are cleaned by specially appointed agencies. The work of desilting is carried out in phases. About 60% of the work is carried out before monsoon. 20% during monsoon and balance 20% post





monsoon. Further, silt from all the water inlets are also removed. About 50% of the water inlets is cleaned departmentally by Wards Staff while balance 50% are cleaned by NGO Labourers.

Development of Mithi River :

Government of Maharashtra has established 'Mithi River Development and Protection Authority' under the Chairmanship of Honorable Chief Minister of Maharashtra state on 19th August 2005 for improvement of Mithi river. Total length of Mithi river is 17.8km, out of which a length of 11.84 km. is in the jurisdiction of MCGM and the remaining 6 km. is under MMRDA. 95% work of widening and deepening of Mithi river has been completed till date.

Out of 18.96 km. length of retaining wall to be constructed, construction work for the length admeasuring 13.80 km is completed by MCGM till date. Length of 1937 mtrs. within Airport jurisdiction, about 573mtrs. length is to be constructed by private developers. The Mithi River training work in Group No. 5 from Pipeline Road to Filterpada in 'S' ward is in progress, 2246 mtrs out of 2300 mtrs of retaining wall is completed, till date. Tender for the length of 1725 mtrs. for the training of Mithi River in Group No. 1 and 3, has been prepared and and being invited shortly. However for balance 1037 mtr. the work in these stretches can only be started on removal of encroachment.

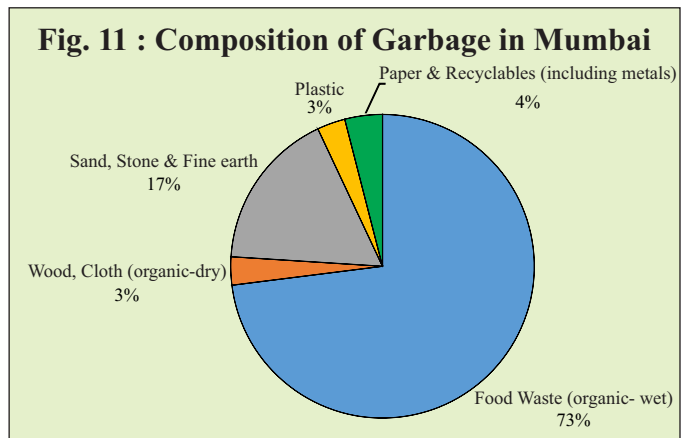
SOLID WASTE MANAGEMENT

The approximate quantity of solid waste generated in Mumbai is over 8600 metric tones per day (MTPD). Categories of waste that can be separately collected in terms of types and quantity of waste generated i.e. Food waste & vegetable waste 73%, Recyclable i.e. paper, plastic, metals & glasses 10%, inert matter 17%, (Table.15) of the 8600 tones transported by vehicles in 3746 trips/day.

**Table 15 :
COMPOSITION OF GARBAGE IN MUMBAI**

Sr. No.	Type of Solid Waste	Percentage
1	Food Waste (organic-wet)	73%
2	Wood, Cloth (organic-dry)	3%
3	Sand, Stone & Fine earth	17%
4	Plastic	3%
5	Paper & Recyclables (including metals)	4%
	Total	100

Source: This Information is received from SWM dept of MCGM



The major metropolis all over the country are facing the problem of solid waste disposal. Urban solid waste contains biodegradable, non-biodegradable, construction, demolition and hazardous waste. The dumping of garbage not only gives an ugly sight when it is visible, but also poses health hazard as it is a breeding ground for mosquitoes, flies, rodents etc. which are the carriers for diseases-causing pathogens. It also aggravates air pollution, ground water pollution and soil pollution affecting the fragile ecosystem.

The garbage from all over city is collected and at present, the garbage is disposed off at the 2 dumping sites in Deonar and Mulund by simple dumping and leveling & at Kanjur by Scientific disposal. Scientific Closure Project at Gorai has been completed and operation and maintenance of the site is in progress. Deonar dumping ground is the largest one, receiving approximately 23.50%, Kanjur receiving 35.30% & Mulund receiving 41% of the total garbage. Capacities of different dumping sites in mumbai shown in table No.16 & input load of waste shown in Table No. 17.



Fig. 12 : Municipal Solid Waste Dumping Grounds & Refuse Transfer stations

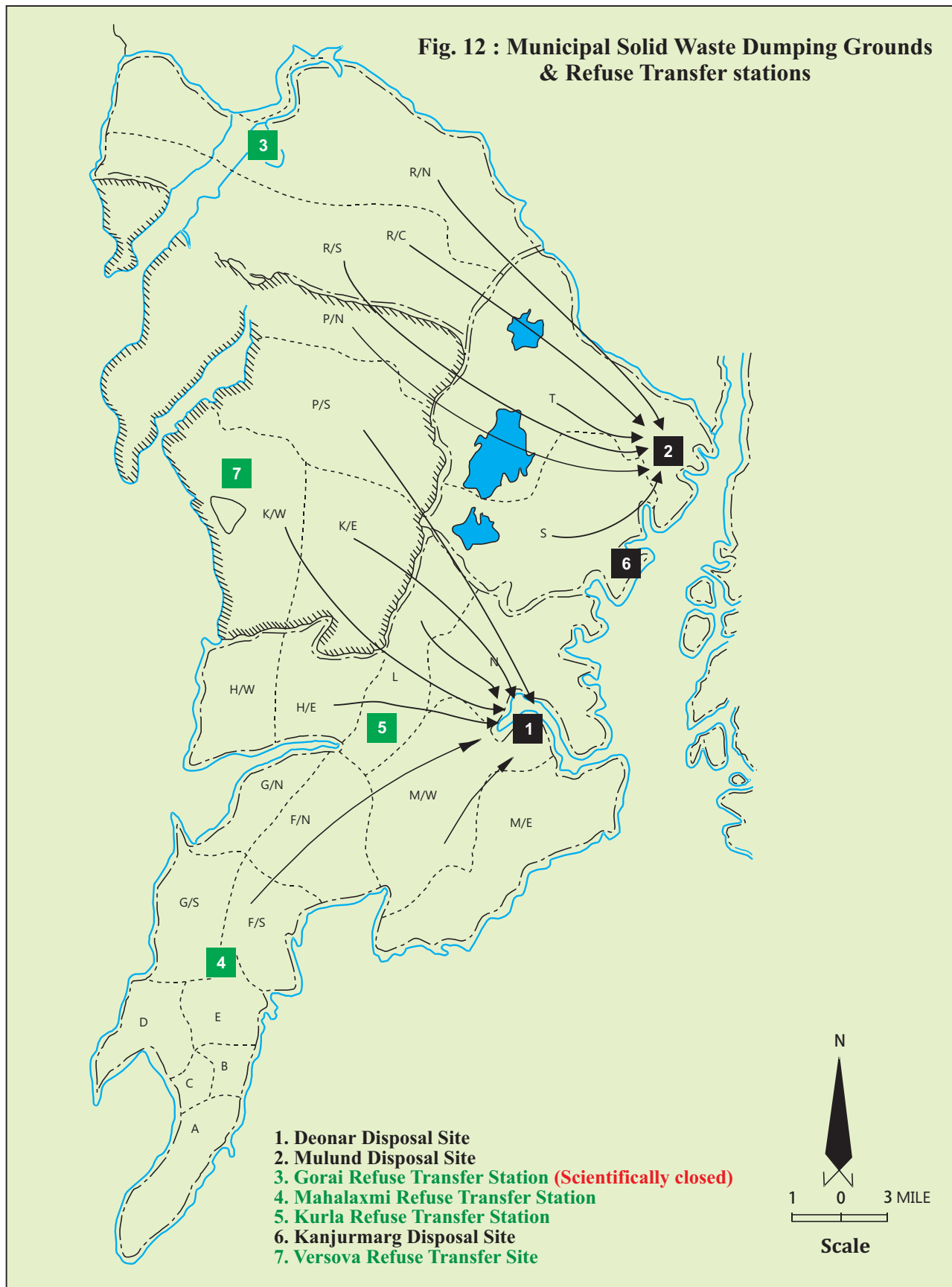




Table No.16 : CAPACITIES OF DIFFERENT DUMPING SITES IN MUMBAI

Disposal Site	Area (Ha) Filling m	No. of Years in Use
Deonar	132	85
Mulund	25	44
Kanjur	65.96	1

Source: This Information is received from SWM dept of MCGM

Table No. 17 : INPUT LOAD OF WASTE

Sr. No.	Dumping Ground	Classification of Waste	Tonnes/day
1	Deonar	Garbage	2100
2	Mulund	Garbage	3500
		Debris	800-1000
3	Kanjur	Garbage	3000

Source: This Information is received from SWM dept of MCGM

There are 5171 no. of 1.1-cubic meter containers and 79 Dumper placer containers at 3106 Community Collection Points and 78% of total garbage is collected through House -to- House collection. The daily Municipal Solid Waste (MSW) is collected and transported by deploying various types of vehicles.

Table 18 - SALIENT FEATURES OF TRANSPORTATION FOR SOLID WASTE

Sr. No.	Type Of Vehicle	Number of services 2013-14	Number of services 2014-15	Number of services 2015-16
1	Compactors	1853	1869	1654
2	Skip Vehicles	321	269	130
3	Dumpers	182	242	247
4	Bulk Refuse Carriers	49	51	35
5	Tempo/Jeeps	1322	1370	1315
6	JCB Machines	53	80	62
7	Stationary compactors	19	46	57
	Total	3799	3927	3500

Source: This Information is received from SWM dept of MCGM

Swaccha Bharat Mission :

In response to the appeal made by Hon. Prime Minister for implementing the Clean India Mission (Swaccha Bharat Mission), various authorities under control of the State Govt. and Central Govt. have taken up activities to clean the City of Mumbai. MCGM being the prime agency, responsible for maintaining cleanliness in the city, a concerted and joint effort has been taken up along with the State and Central Government agencies which occupy large spaces through their commercial and residential premises. The efforts to make this mission a success has been started from 02nd Oct 2014 on the occasion of Gandhi Jayanti under “Swaccha Bharat-Swaccha Mumbai Abhiyan”. For achieving the desired level of cleanliness under this Mission, the efforts and programs of Solid Waste Management department have been redesigned. Under this drive, various programs undertaken as follows:





Public Awareness :

To create awareness amongst the general public about the cleanliness drive taken up by MCGM, “Shramadaan” programs are carried out every Saturday between 11:00 a.m. and 1:00 p.m., simultaneously in the 227 Councilor ward areas. Also, 2 hour cleanliness drive is taken up in MCGM offices and its surroundings on every Friday to create awareness about cleanliness amongst the Municipal Officers and their staff.

Pelletisation 'Green Coal' Project :

Pelletisation 'Green Coal' Project is in operation since May 2014 by a private operator. The garden and coconut waste is collected from all wards. On an average 12 to 15 tonnes of waste is processed per day.

Integrated Solid Waste Management Projects :

MCGM has undertaken Integrated Solid Waste Management Projects at Deonar, Mulund Dumping Ground and Kanjur Landfill Site during the year 2008-09 in order to process daily received garbage in a scientific manner in accordance with the MSW (Management & Handling) Rules 2000. MCGM had awarded these projects on Designing, Build, Own, Operate & Transfer (DBOOT) basis and a public- private partnership format for a period of 25 years. However, due to the failure of private operator of Deonar project to complete the project works within the stipulated period as per the terms & conditions of the concession agreement MCGM has terminated the contract of Deonar project from the midnight of 30.01.2016 after the sanction of the standing committee during the meeting of 22.12.2015.

For the same reason the contract of Mulund project was terminated on 08.09.2015 with immediate effect. However, the Kanjur Landfill project is still in progress and the current status of Kanjur project is as follows:

Kanjur Landfill Project:

As per orders of Hon'ble High court and Supreme Court, the Government of Maharashtra handed over a plot admeasuring 141.77 hectares area at Kanjur to MCGM in dt.24.10.2005 for developing MSW landfill site. Thereafter considering mangroves area and CRZ area the available land for project work is 65.96 Ha. On the recommendation of Technical Appraisal Committee of Central Pollution Control Board in its meeting held in dt.25.07.2011 Maharashtra Pollution Control Board gave the authorization under MSW (M&H) Rules 2000 in 21st October 2011. Revised Environmental Clearance for the project is received from State Environment Impact Assessment Authority Maharashtra (SEIAA) on 05.12.2014. Erection of 1000 MT capacity Windrows Compost Plant is in progress. Receiving of MSW in Bio-reactor Landfill Cell-1 is started from 6th March 2015. At present, processing of approx. 3000 TDP of MSW is being done scientifically with the help bioreactor technology. In addition, Environment Department of State Govt. has been requested to allow processing of MSW on additional land of approx. 52.45 Ha. At Kanjur, which is under CRZ-3, Once this request is granted, 1000 MT additional quantity of MSW can be processed at kanjur in near future.

Hon. High Court vide it's order dtd. 29.02.2016 has granted permission to receive daily MSW at Deonar Dumping Ground at Mulund Dumping Ground upto 30.06.2017

In order to scientifically process MSW generated in the city of Mumbai, MCGM has prepared action plan which is as follows;

1. **Waste to energy plant of 2000 TDP capacity at Deonar:** M/s. Tata Consultancy Engineering Services has been appointed as consultant for this & they have started their work.
2. **Compost plant of 1000 TPD capacity at Kanjur :** In addition, Environment dept. of State Govt. has been requested to allow processing of MSW on additional land of approx. 52.45 Ha. At Kanjur, which is under CRZ-3. Once this request is granted, additional quantity of MSW can be processed at Kanjur in near future.
3. **Recovery of land at Mulund Dumping Ground by processing existing dump with the help of suitable technology :-** The tender process for the same is in progress. Receiving of garbage will be stopped from 2017.





4. **Scientific processing of waste at Airoli:** Approx. 5000 TPD at land near Airoli bridge, Mulund (East) admeasuring 32.77 ha., allotted by State Govt. to MCGM. Of this, scientific processing of approx. 2000 TPD of garbage is expected to commence from 2019.
5. **Scientific processing of approx. 1000 MTD of waste at village Karavale, near Taloja:** Land admeasuring 38.87 ha., for scientific processing of waste at village karavale, near Taloja, allotted by State Govt. to MCGM. Also, it is proposed to process 1000 MTD scientifically inerts, debris from construction etc.

Municipal Solid Wastes (Management and Handling) Rules, 2000:

- To regulate the Management and Handling of Municipal Solid Waste, Central Government has made the rules as per Environment Protection Act (1986) (29 of 1986)
- These rules are called as “Municipal Solid Waste (Management and Handling) Rules, 2000
- The rules consists of 04 schedules namely:
 - ★ Schedule I – Regarding Implementation schedule: Schedule I gives us the time frame for setting up Identification, Improvement Monitoring of Landfill sites and Setting up of Waste processing and Disposal facilities.
 - ★ Schedule II – Regarding management of Municipal Solid Waste: Schedule II elaborates about the Collection, Segregation, Storage, Transportation, Processing and Disposal of Municipal Solid Waste.
 - ★ Schedule III – Regarding specifications of Landfill sites: Schedule III involves specification of Landfill Site, which consists of Site Selection, Facilities at Site, Specifications, Pollution Prevention, Water Quality and Ambient Air Quality Monitoring, Plantations, Closure and Post Care of the Site.
 - ★ Schedule IV – Regarding standards for Composting, Treated Leachate and Incineration: Schedule IV this consists of Standards to be adapted for Composting, Leachate Treatment and Incineration.

1. Compliance of Schedule I:

MCGM has complied with the requirements pertaining to storage, collection and transportation of MSW. Further, MCGM has tried to award projects for treatment of Disposal of MSW in compliance with the requirements of MSW Rules 2000.

2. Initiatives for compliance of Schedule II:

- a) **Public Participation** : Involvement of Advanced Locality Management Groups and Community Based Organisations. Enhanced role of Non Government Organisations in field of SWM Formalizing the role of rag pickers and recyclers in the process of SWM
- b) **Institutional strengthening** : Capacity building in terms of training and seminars for SWM staff at all levels.
- c) **Regulatory Mechanisms/ Policy Framework:** Implementation of Greater Mumbai Cleanliness and Sanitation Bylaws 2006 for improving civic sense in citizens.
- d) **Finance:**
 - Public-Private-Partnership (PPP) model for appointing agencies for work of Collection and Transportation of MSW.
 - PPP model for appointing agencies for work of Treatment and Disposal of MSW
 - PPP model for appointing agencies for work of construction and operation of refuse transfer stations.

3. Compliance of Schedule II, Sr. no. 1 : Sweepers and Motor Loaders- 28,018 Nos. are provided with safety gears and tools-tackles for minimizing contact with refuse while carrying out their daily works and ensuring safe working conditions.





4. Compliance of Schedule II, Sr. no. 3 : Pole Mounted litter bins, 120/240 Ltr. EN-840 Std. Wheel Bin, 1.1Cu.M G.I. /M.S. container, 5.2Cu.M closed Skip vehicle container with lid for temporary storage in closed containers.

5. Compliance of Schedule II, Sr. no. 4 : Deployed Fleet of Closed Body Vehicles [374 municipal and 989 private vehicles], which are compliant with MSW Rules 2000. They make around 1900 trips per day to the Dumping Ground. Four transfer stations combined capacity of 2100 MT per day use Closed Body Vehicles for bulk transportation of MSW.

6. Compliance of Schedule III : The Municipal Corporation of Greater Mumbai (MCGM) intends to develop MSW processing and disposal facility with capacity of 1000 Tonnes Per Day at the cost of Rs.250 cr. approximately under Public Private Partnership (PPP) mode. Global EOI (Expression of Interest) for processing of MSW with the help of Biomethanation Technology or combination of various technologies which will generate Energy at various locations in Mumbai are invited.

Service Level Benchmarking :

To monitor the performance of any ULB regarding its Service Delivery to the Citizens, MoUD has devised benchmarks for each service delivered. For Solid Waste Management Dept. there are 8 such benchmarks. The benchmarks are elaborated below.

Description of service	Target	Achieved
Coverage of SWM services through Door to Door collection	100%	80%
Efficiency of Collection	100%	100%
Extent of Segregation of Municipal Solid Waste	100%	27%
Extent of Municipal Solid Waste Recovered	80%	3%
Extent of Scientific Disposal of Waste at Landfill site	100%	30%
Efficiency in Redressing Customer Complaints	85%	95%
Extent of Cost Recovery in SWM Services	100%	100%
Efficiency in Collection of SWM Charges	90%	100%

Bio-Medical Waste (Management & Handling) Rules, 1998 :

Bio Medical Waste (Management and Handling) Rules, 1998 are notified by Ministry of Environment and Forest, Govt. of India, under Environment Protection Act 1986 vide Notification dated 20/07/98. As per the rules it is the duty of 'Occupier'/'Generator' to ensure that BMW is handled without any adverse effect to human health and environment by way of segregation, packing, transportation, storage, final treatment and disposal. An 'Occupier' is defined as an institutions like Hospital, Nursing Home, Clinic, Dispensary, Veterinary Institution, Animal House, Pathological Laboratory, Blood Bank etc. which generate BMW.

MCGM owns major Hospitals, Maternity Homes, Dispensaries and Clinics. MCGM is therefore considered to be an 'Occupier' and is required to dispose off the BMW generated in these institutions as per BMW Rules 1998.

Moreover as per the BMW sub rule 6(6), it is not an obligatory duty of MCGM to collect & treat the BMW generated from private health care establishments.

However, as per amended BMW Rules 2000, sub Rule no.14, Municipal Corporations should provide suitable sites to private medical institutions for installation of common treatment facility without prejudice to the duty of 'Occupier'. Accordingly, MCGM has provided suitable land at Deonar dumping ground for installation of bio-medical waste treatment plant for disposal of bio-medical waste generated in Mumbai.

As such, MCGM has installed integrated bio-medical waste treatment facility under the guidance of MPCB at Deonar dumping ground through M/s. SMSL- Water Grace Products (JV) (M/s. SMS Envoclean (P) Ltd.).





The said facility has started its operation from May 2009. M/s. SMS Envoclean (P) Ltd has put 46 no. of specialized vehicles for collection of bio-medical waste from all health care establishments. Those Health Care Establishments who are registered with the BMW treatment facility are being provided the services of BMW disposal by M/s. SMS Envoclean (P) Ltd. As of now 10485 no. of health care establishments are registered with the centralized facility, daily 15 to 16 M.T. of BMW is collected & treated at Deonar BMW treatment facility.

The provisions under BMW Rules, states that the prescribed authority is Maharashtra Pollution Control Board and they are supervising the operation of the plant. An 'Authorization' to the plant operator of BMW treatment plant is issued by MPCB as per rule, it is also necessary to obtain an authorization from MPCB as a "Generator" who are generating the bio-medical waste.

E-Waste (Management and Handling) Rules, 2011:

- 1) For non-mixing of e-waste with municipal solid waste, MCGM has set up one e-waste collection center at K/W ward.
- 2) Also, MCGM has planned to set up e-waste collection centers in 24 wards in Mumbai. The work of e-waste collection center has been given to MPCB authorized electronic producers, e-waste collectors, dismantlers and recyclers. Disposal of collected e-waste under rule 2011 of e-waste (Management and Handling) will be managed by authorize MPCB person carrying out disposal and recycling.

Dry Waste Segregation Centers:

MCGM has 35 dry waste centers across Mumbai. 35 new places are proposed to set up additional new dry waste collection centers. Rag pickers and waste pickers from some NGOs are engaged to collect the dry waste from the municipal solid waste. Collected dry waste is sent to the dry waste centers and then the dry waste is segregated as per the type paper, card board, thermocol, plastic etc. Separate vehicles are provided for collection of dry waste in all the 24 wards. 46 vehicles are provided for dry waste collection from dry waste generation points and transport to the dry waste centers in Mumbai. The segregated plastic waste is sent to recyclers for recycling.

MCGM framed their own By-laws in 2006, named as "Greater Mumbai Cleanliness & Sanitation Bye-laws. These Bye-laws are applicable to every public place within the limits of Greater Mumbai, to every generator of Municipal solid waste and to every premise under the ownership or occupation of any person within the limits of MCGM.

Plastic Management and Handling Rules, 2011:

Plastic causes maximum nuisance such as clogging of drains, choking of gutters and its combustion poses health hazards due to release of toxic gases and moreover, it is non-biodegradable. MCGM has banned the plastic bags below the 50-micron size as a preventive measure in accordance. The enforcement squads of MCGM under Shops and Establishment Department conduct periodic raids and take action against manufactures and traders of plastic bags below 50 microns. Maharashtra Pollution Control Board has authority to take action on the defaulter manufactures of plastic.

Hazardous Waste Management Rules are notified to ensure safe handling, generation, processing, treatment, package, storage, transportation, use reprocessing, collection, conversion, and offering for sale, destruction and disposal of Hazardous Waste. The Rules lay down corresponding duties of various authorities such as MoEF, CPCB, State/UT Govt., SPCBs/PCCs, DGFT, Port Authority and Custom Authority while State Pollution Control Boards/ Pollution Control Committees have been designated with wider responsibilities touching across almost every aspect of hazardous wastes generation, handling and their disposal.

Land admeasuring 38.87 ha., allotted by State Govt. to MCGM. Also, it is proposed to process 1000 MTD scientifically inerts, debris from construction etc.





POWER SUPPLY AND CONSUMPTION

Brihanmumbai Electric Supply and Transport (BEST), an undertaking of MCGM, Reliance Infrastructure Limited and Maharashtra State Electricity Distribution Company Limited (MSEDCL) supply the electric power to Greater Mumbai. Tata Power Company Ltd. (TPC) supplies bulk power to some industrial units and railways.

BEST is the distribution licensee to supply electricity in the old city limits of Mumbai. It covers approximately 69 sq. km. area i.e. Colaba to Sion and Mahim. The maximum demand of Mumbai city is 890 MW. To meet this demand, power is purchased in bulk from Tata Power Company (G) under power purchase agreement and balance is met from other sources. BEST undertaking has established 61 RSS, 2287 DSS, 7593 distribution pillars, 74245 services position, 40819 street lights and 116 bill collection centers for serving consumers of Mumbai city.

BEST undertaking has 10.12 lakh consumers. Out of the total consumers, BEST is supplying electricity to about 73% residential consumers at a subsidized rate. BEST has provided ECS facility for payment of bills. In addition to this, consumers can pay the bill through post offices, various branches of 11 banks, credit/debit cards of HDFC Bank, NEFT/RTGS and through various outlets of private service providers such as Pay point, Bill Desk and Easy Bills. From 7th August 2013, the facility of bill payment through mobile is also provided to the consumers.

Table No. 19 : Consumers, Connected Load and Consumption for 2015-16 (till February).

Sr. No.	Consumers Category	Mumbai City			
		Consumers	Connected Load in KW	Consumption Apr 15 to Feb 16 in Million Units (MUs)	Avg. Monthly Consumption (MUs)
1	HV Consumers	182	371073.67	661.17	60.11
2	LV Consumers	1012160	3428199.52	3584.68	325.88
	Total	1012342	3799273.19	4245.85	385.99

Table No. 20 : Category wise Consumers, Connected Load and Consumption for FY 2015-16 (till February)

Sr. No.	Consumers Category	Mumbai City			
		Consumers	Connected Load in KW	Consumption Apr 15 to Feb 16 in Million Units (MUs)	Avg. Monthly Consumption (MUs)
1	Residential	735341	1954437.17	1831.80	166.53
2	Commercial	265648	1498737.04	2021.42	183.77
2	Industrial	8779	219722.74	317.32	28.85
2	Others	2574	126376.24	75.30	6.85
	Total	1012342	3799273.19	4245.85	–

During interruption in power supply, various departments of BEST undertaking functions round the clock in restoring the same. For coordinating and supervising these departments, 3 supervisory controls, 4 fault controls and 8 fuse controls are working round the clock. As such BEST does not give load shedding to its consumers.

Reliance Infrastructure Limited supplies uninterrupted electric supply to all the suburbs spanning 400 sq.km. except Kanjurmarg, Bhandup and Mulund. It includes Residential, Commercial and Industrial



consumers. Reliance Infrastructure Limited sources power from Dahanu Thermal Power Station, Mid-term power procurement contracts and the rest is on short term basis. Mandatory 8% of the total energy requirements is renewable, procured as per MERC regulations.

Reliance infrastructure company conducts energy conservation and energy efficiency (EC and EE) programmes to create awareness in the society on the importance of energy conservation and smart usage of energy in order to educate consumers on Energy conservation and Energy efficiency. The ultimate goal is to make every citizen of Mumbai a part of this programme and make this programme as Citizen's Movement. The Company through “Urja Samvardhan Upakaram programme”, conducted workshops in various academic institutions, officers, banks, hospitals, industrial estates, housing societies, slum areas, etc. reaching out to more than 13,000 consumers and educated them on 'Why to conserve and how to conserve energy'.

Energy efficiency & Energy conservation programme (2015-16) internal & external consumer :

- 1) This include LED tubelights, application of Thermo conductive fluid for Air conditioner, Smart End Use management system technology in Air conditioning units & motion sensors in wash rooms, conference rooms & cabins for energy conservation. This resulted in saving of a 0.3mu approximately. 5-Star split Air conditioner (AC) Programme Residential Consumers for replacing old window AC units with energy efficient 5-star rated split ACs, with replacement of 1100 ACs estimated savings of 0.45 million units.
- 2) Detailed Energy Audit Scheme by providing detailed energy audit services to its customers. Under this scheme over 30 energy audits have been conducted identifying energy saving potential of over 5.06 million units. In addition to this walkthrough energy audit services at no cost to consumers, under which company has conducted over 100 audits with potential savings of 20 million units.

The ongoing programs implemented earlier include 5 Star Ceiling Fans Programme for replacing old fans, AC Automation programmer for commercial and industrial consumers, with the objective of automation in air conditioning for chiller plant, ductable split, cassette and package air conditioners, 5 Star Refrigerator Programme for residential consumers for replacing old refrigerators with new energy efficient refrigerators.

The Company is committed for safeguarding the environment while aiming at sustainable development through sound Environment Policy. Preservation and promotion of environment is of fundamental concern in all its business activities and with this spirit, the Company has effectively established and implemented “Environmental Management System” (EMS) base on ISO 15014001:2004 standard and has been successfully certified against the standard in June 2015.

The Company through “Let's Turn Around Campaign” sensitized employees and other stakeholders on environmental issues by conducting environmental management programmes. The Company celebrates major environmental events to create wide scale employee and customer sensitization and to further raise the environmental awareness amongst them. Every year in line with UN international Year Theme, company declares its “Sustainability Theme of the Year”, thereby demonstrating its commitment towards Environ protection and sustainable development. In 2015-16 the theme was “consume with Care” & various measures were taken in support of the theme.

The Company along with Management of Sanjay Gandhi National Park at Borivali, organized a campaign involving the collection of plastic and other waste with the participation of employees and local people. More than 475 kilogram of plastic and other solid waste was collected and safely disposed with the help of Park authorities. In similar such programmes another 5000 sapling are created in their Nurseries at Thane, Mulund and Rabale. More than 420 Company employees participated in the aforesaid voluntary labour activity.

Maharashtra State Electricity Distribution Company Limited Thane urban zone supplies electricity to Bhandup and Mulund area of MCGM. Bhandup and Mulund Zonewise information is as follows.





Table No. 21 : ZONEWISE CONSUMERS & THEIR CONSUMPTION (2015-16)

Sr. No.	Category	Division Name					
		Bhandup			Mulund		
		Total Consumers	Connected load (KW)	Consumption (Mus)	Total Consumers	Connected load (KW)	Consumption (Mus)
1.	High Voltage Consumers	85	172068	230	43	35294	49.84
2.	Low Voltage Consumers (Domestic, Commercial, Industrial & Others)	160418	296286	412	119600	339678	383.75
	Total	160503	468354	642	119643	374972	433.59

Table No. 22 : CATEGORY, TOTAL CONSUMERS AND CONSUMPTION

Sr. No.	Category	Division Name					
		Bhandup			Mulund		
		Total Consumers	Connected load (KW)	Consumption (Mus)	Total Consumers	Connected load (KW)	Consumption (Mus)
1.	Residential	139270	171372	236.95	103457	242633	259.35
2.	Commercial	16335	53099	64.00	14128	60452	73.88
3.	Industrial	4339	66771	101.08	1303	30133	41.51
4.	Others	474	5045	9.96	712	6460	9.00
	Total	160418	296287	411.99	119600	339678	383.74

Electricity Demand

- a) Bhandup Division – 143 MW
- b) Mulund Division – 101 MW

Load Shading:

Bhandup and Mulund zones fall under 'A' group of Maharashtra State Electricity Transmission Company. Now at present, zones classified under 'A' to 'D' groups do not face load shading.

Information about Sub Stations :

Four transmission substations supplies electricity to Bhandup and Mulund area. These transmission substations come under Maharashtra State Electricity Transmission Company. To get proper electric supply there are 16 No. of sub stations (Capacity 350MVA) 22/11 KV at Bhandup and 8 substations (capacity 210 MVA) 22/11 KV at Mulund. One switching sub station is working in Bhandup area.

1	220/22kV Mulund
2	220/22kV GIS Bhandup
3	220/22kV Tata Saki
4	220/22kV Tata Salshet

During 2015-16, works carried under R-APDRP Part B-7.18 Crs. Under Bhandup and Mulund Division.

Tata Power traditionally supplies power to bulk consumers such as Railways, MbPT, Refineries, textile mills, Fertilizer Company, BARC and other industries requiring uninterrupted power supply. However, new connection are being given to various consumers in industrial, commercial and residential sectors.



ROADS, TRAFFIC AND TRANSPORT

The city of Mumbai has a network of roads consisting of highways, main arterial roads and other minor roads covering almost every nook and corner of the city. Total length of the road is 1941.16 km within MCGM limits. Road Transport is the source of air pollution. Transport through Cement Concrete and Asphalt roads is smooth and fast which generates less RSPM. Frequent use of brakes increases pollution e.g. Due to incomplete combustion CO is generated. Decreasing Traffic congestion can reduce pollution and fuel consumption. Metro and Mono Railway has started as a very good option to Road Transport.

1) Road Reforms:

Road is important and visible infrastructure. In accordance with the recommendations of the Standing Technical Advisory Committee (STAC) for roads, major changes have been made in the approach to road constructions, improvement and maintenance. With increase in traffic intensity & loading, related norms have been upgraded and project approach has been adopted as per which road work also includes provision/improvement of footpath, provision/ augmentation of municipal utilities such as water-mains, sewer lines, S. W. Drains etc. As per necessity, provision of traffic amenities, beautification etc. Trenching & Reinstatement procedures have also been modified to reduce frequent digging. New Technologies like Carboncor, Matrex, Wander Patch and Jet Patching Machines are introduced to effectively attend to road repair and maintenance.

In Mumbai, the total length of the road is 1941.16 km. out of which 506.46 km. length is in City division, 927.64 km. length is in Western Suburbs division and 507.06 km. length is in Eastern Suburbs.

2) Master Plan for MCGM roads:

Master plan was prepared for wards in Mumbai for year 2013-14, 2014-15 & 2015-16. It included details regarding major roads (width more than 30 ft.) & minor roads (width upto 30 ft.) their Nos., lengths & expenditure accordingly. For carrying improvement of said roads, Design Consultants were appointed to prepare drawings & design.

3) Cement Concrete Roads:

Considering increasing volume traffic MCGM has continued. Cement concretization of major roads and adjoining roads from 1989 concretization of approximately 651 km. of roads completed.

In city area approximately 4.41 km. of road were concretised in 2015-16.

In Eastern Suburbs approximately 10.08 km. of roads were concretised in year 2015-16. It included roads at Veena Nagar (T ward), V. N. Purav Marg (M/E), Mother Dairy Road (L ward), Vidyavihar Station Road (N ward), Kurla Terminus road (M/W).

In Western Suburb approximately 35.61 km. ward were concretised in 2015-16. It includes major roads such as Makwana Road & Military Road (K/East) ward, Oshiwara road (K/West), Jawahar road no. 1 (P/South), Borsapada Road & M. G. Road (Kandivali West).

4) Asphalt Roads:

In city section 28.17 km. of Asphalt roads were improved/widened in the year 2015-16 in that improvement of important roads such as Mahapalika Marg, Pandita Ramabai Marg, Pedder road was completed.

In Eastern Suburbs around 55.03 km. of Asphalt roads were improved/widened in the year 2015-16. In Eastern Suburbs works of improvement of Sardar Pratapsinh road (S ward), JVLR road (S ward), Pravin Vichare marg (N ward), Road no.16, Shivaji Nagar (M/East), North Bombay School road (N Ward), Sindhi Society road (M/West) were completed.

In Western Suburbs around 47.20 km. of Asphalt roads were improved/widened in the year 2015-16. In Western Suburbs New English School Road (H/East ward), 2nd Hashnabad road (Khar west), MIDC 'A' cross road, Sant Muktabai Road (K/East), Sunder Nagar Road (P/South) Valnai internal road, Nadiadwala colony road no. (P/North) road works are completed.





5) Mumbai Coastal Road Project:

A Joint Technical Committee was appointed, by Maharashtra Government under the Chairmanship of the then Hon. Municipal Commissioner. The said committee has recommended to construction coastal road expressway 33.77 Km. from Nariman point to Malad marve. Recreational facilities can be made available along the long of said coastal road. MCGM has appointed M/s STUP consultants and E & Y consultants as technical consultants and they have submitted Draft project report to take peer review consultant M/s. Frischmann Prabhu has been appointed. Their work includes suggestion and objection for public and to decide infrastructure of proposed coastal road.

Environment and Forest Minister, Government of India has accorded sanction on 30 December 2015, to the modification to CRZ rule 2011. Accordingly, Coastal Road Project has been submitted for approval of MCZMA. The work can be taken after getting approval of Environment and Forest Ministry, Government of India. MCZMA in its 111th meeting on 16th January 2016 has accepted environmental clearance for coastal road project and has proposed to recommend the said proposal to Central Forest and Environment, Ministry on certain terms and condition.

6) New Trenching Guidelines:

New guidelines have been framed for trenching work so that the trenching work is synchronized with the ongoing road works so as to minimize interrupted traffic movement. Horizontal Drilling Method is insisted and encouraged to minimize the open cut in road. A new technology of micro-trenching which is less invasive is also introduced. Depending upon the status of Defect Liability Period (DLP), rates of reinstatement of trenches have been revised.

For 1st year of DLP-4 times

For 2nd year of DLP-3 times

For 3rd year of DLP-2 times

For 4th year of DLP-Standard rate

Concretisation of approx. 50.10 km of roads is completed during the year 2015-16 in MCGM limits.

Traffic

Mumbai has the distinction of high share in favour of public transport system. About million people travel by public transport every day. Role of existing suburban railway system is extremely important in the life of million passengers every day. BEST provides feeder services to largely station going passengers to complete their journey. Due to city's increased population geographical constraint, road and railway infrastructure could not keep space with the growing population. Inadequate road network slows down the traffic causing congestion and pollution.

Road is an important and visible infrastructure. The city of Mumbai has a network of roads consisting of highways, main arterial roads and other minor roads covering almost every nook and corner of the city. Road designs are obtained from reputed consultants in the field for the construction of the roads. Factors like traffic density, drainage, sub grade condition, etc. are considered while preparing road designs. While improving roads, required works of laying water mains, sewer lines, etc. are also carried out in road project so as to avoid subsequent digging by MCGM's internal utilities. For the convenience of pedestrians, new footpaths are constructed and existing footpaths are improved with interlocking paver blocks along with facility for physically challenged persons in such road works. The project approach also includes provision of traffic amenities such as lane marking, informative signage, etc. for disciplining/helping vehicular traffic as also street



name boards, tree guards, railings, etc. for helping road users. Central median is provided and beautified on important roads.

To ensure that the roads are regularly maintained and to achieve longevity of the roads with lesser expenditure, Road Maintenance Management System (RMMS) is implemented. In RMMS, every road is numbered and a small group of these roads are formed. Responsibility of each road is put under a Sub-Engineer to designated as Road Engineer (RE). It is expected that RE will prepare estimates and look after the maintenance of each road under his jurisdiction. This will bring in accountability. The system will prepare priority list of the roads to be repaired and also will furnish report on present condition of the road.

Under Mumbai Area Traffic Control Project, 255 signal junctions in Greater Mumbai have been upgraded. Two separate control rooms are established at Worli one each in traffic police office and in MCGM traffic office for maintaining their signal junctions. Due to this project it was observed that travel time, traffic congestion and fuel consumption have reduced by making signal respond to traffic density.

1) Parking Policy:

Parking Policy has been approved by MCGM recently and it was proposed to start the same on experimental basis in 'A' ward area. However, State Government has stayed the said Parking Policy. MCGM has requested State Government to implement the said parking policy and State Government is considering the said policy.

2) Comprehensive Mobility Plan (CMP) for Mumbai:

MCGM has appointed Consultant M/s. Lea and Associates South Asia Pvt. Ltd. to totally improve the traffic control at different places in Mumbai city, in future and to “Preparation Comprehensive Mobility Plan” (CPM). The said consultant after studying the various aspects of traffic in detail, has submitted final plan to MCGM so as to overcome traffic congestion in Mumbai.

The main features of the work carried out by consultant are as follows.

- a) To survey the number of citizens travelling through various vehicles size. Best bus, Railway, Car, Taxi, Auto Rickshaw, Motor Cycle, Cycle, Monorail, Metro etc. in Mumbai.
- b) To gather and study the available information from various organizations such as MCGM, MMRDA, PWD, Railways, BEST, Besides that to collect the new necessary information and study the same.
- c) To collect the data regarding traffic in Mumbai & to digitized the same (simulation study).
- d) To collect snapshots at various locations in Mumbai depiction the exact status of traffic situation.
- e) Survey regarding Parking lots, direction boards, junctions and to study the incomplete roads.
- f) To the traffic signal system at various places in Mumbai and to examine the requirement at new places.

In Comprehensive Mobility Plan (CMP) various options such as construction of new roads, road widening of existing roads, traffic management in the premises of Railway Station, Pedestrian bridge, Subways, Road over bridge, ATC signal system are suggested.

The various short term, mediums and long term options as suggested in the said traffic and transportation infrastructure facilities plan shall be studied and policy division will be taken.

3) Area Traffic Control (ATC):

The Area Traffic Control System Project was completed with the help of World Bank, 253 traffic control systems have been improved under ATC project which is commissioned. Digital countdown system has been installed at all conventional traffic signal systems in Mumbai & the same are properly functioning. 240 CCTV cameras are installed at various junctions in Mumbai & the same are properly maintained. The two traffic control cells installed for ATC signal systems (Traffic police head quarter and MCGM office, Worli) are working properly.





The final report has been submitted by the consultant for Traffic Management in Mumbai which was appointed by traffic department of MCGM to prepare Comprehensive Mobility Plan (CMP). In the said report it has been proposed to upgrade the remaining traffic control signal and the same will be taken in various stages.

Mumbai Urban Infrastructure Project (MUIP):

The government of Maharashtra has designated MMRDA as project implementation agency (PIA) for several infrastructural projects in the city. MUTP is one such ambitious project being implemented in co-ordination with other agencies like Mumbai Railway Vikas Corporation (MRVC), MCGM, Maharashtra State Road Development Corporation (MSRDC) and BEST.

Three major components of this project are 1) Rail transport, 2) Road transport and 3) Resettlement & rehabilitation of people affected by rail transport project and road transport project.

To supplement the MUTP, MMRDA has initiated MUIP under which an ambitious programme of major arterial and link road network has been undertaken. The Government of Maharashtra approved the Master Plan at an estimated cost of Rs. 2647 crore. As part of MUIP, a Master Plan has been prepared for improvement of network of about 462km in city and suburbs of Mumbai. The Master Plan includes about 134 development plan roads, 41 flyovers, 16 ROB's and 66 pedestrian subways/vehicular subways. Out of total 18 Corridors, 16 Corridors handed over back to the MCGM and 2 nos. Public Works Department.

- Andheri-Ghatkopar Link Road and Jaiprakash Road are handed over to MCGM.
- Eastern Free way Ghatkopar – Mankhurd to P. Demelo Road is open for transportation.

Mumbai Metro Projects Updated Information:

1. Metro Line-1 Versova-Andheri-Ghatkopar :

Varsova-Andheri-Ghatkopar corridor is 11.40 km long elevated corridor having 12 stations. The completion cost of the project is Rs. 2,356 Cr. This metro corridor was opened for public on 8th June, 2014 and is catering to 3 lakh commuters per day.

2. Metro Line-2 A Dahisar (E) to D. N. Nagar (E) :

Dahisar (E) to D. N. Nagar (E) is 18.60 Km long elevated corridor having 17 stations. The projected completion cost for the project is Rs.6,410 Cr. (including all taxes, land acquisition cost and interest during construction period). State Government has accorded its approval to this corridor and Hon'ble PM of India has performed Bhumi Pujan for this project. This corridor would benefit about 16.58 lakh commuters per day.

3. Metro Line-2 B D. N. Nagar to Mandale :

D. N. Nagar to Mandale is an elevated corridor and as per revised Detail Project Report, it is 23.643 Km in length. This corridor has 22 stations. The projected completion cost for the project is Rs.10,970 Cr (with Central taxes at 2015 rates). This corridor would benefit about 10.49 lakh commuters per day.

4. Metro Line-4 Wadala–Ghatkopar–Teen Hath Naka (Thane)–Kasarvadavli :

As directed in a meeting on 20th May, 2015 under the Chairmanship of Hon'ble Chief Minister, MMRDA has appointed DMRC to review and update the DPRs of potential elevated corridor of 118 Km Mumbai Master Plan to implement in next 3-4 years. Wadala-Ghatkopar-Thane (Teen Hath Naka) – Kasarvadavli Metro Corridor is one of the potential elevated metro corridor of Mumbai metro master plan.

The detailed project report of the said corridor is expected to receive by April, 2016 from DMRC and further necessary approvals will be taken for implementation.

5. Metro Line-7 Andheri (E) to Dahisar (E) :

Andheri (E) to Dahisar (E) an elevated corridor and as per detail project report, it is 16.50 Km in length. There are 16 stations in this corridor. The projected completion cost for the project is Rs.6208 Cr. (including all taxes, land acquisition cost and interest during construction period). State Government has accorded its approval to this corridor and Hon'ble PM of India has inaugurated this project. This corridor would benefit about 6.67 lakh commuters per day.



6. Mumbai Monorail Project :

India's first Monorail project is being implemented by Govt. of Maharashtra from SGM Chowk to Chembur via Wadals having 20 Km length and 17 stations. The construction work of this monorail corridor started in February 2009. First phase of monorail (Wadala to Chemubr- 8.80 Km) was opened for public on 2nd February, 2014. The remaining work of second phase of monorail is expected to complete in the current year.

The project cost is Rs.2460 Cr. (excluding taxes) out of which Rs.2250 Cr is used. After completion of the entire project, it would benefit about 1.8 lakh commuters daily.

253 traffic control systems have been improved under area traffic control project which is commissioned.

Bridge in Mumbai

As per the point no.4 under section 243(W) of 12th schedule in Indian constitution. It is responsibility of MCGM to construct bridges for convenience of citizens. In order to carry out comprehensive inventory of the bridges, as per STAC's recommendation, tenders are being invited for appointment of the Consultant for structural condition survey and to suggest the remedial measures for repairs and reconstruction of the bridges.

Similarly, the work of Jogeshwari (North) Railway Over Bridge is nearing completion and the same is expected to be commissioned very soon. The work of construction of Flyover Bridge and junction of S.V. Road and Veer Savarkar Marg at Goregaon (West) is in progress and about 15% work is completed. The work of construction of three bridges on Rafiq Nagar Nalla, Govandi in M/East is completed, whereas, the works of two Foot Over Bridges and five bridges on Nalla, in E.S., one bridge on Nalla in city and three bridges on Nalla in W.S. are in progress. The work of repairs and renovation of Churchgate Subway is started and for Sion Subway is being started shortly.

New Works Proposed

Foot Over Bridges and Bridges :

The construction of Foot Over Bridges near Charni Road railway station and construction of skywalk to connect Jogeshwari (East) to Jogeshwari (W) are expected to be started from October 2016. A budget provision of Rs.9 Cr. is made for this work in the year 2016-17.

Flyovers :

- 1) It is proposed to connect S.V. Road to Linking road by extending Jogeshwari (South) flyover. Similarly, the said flyover will be extended along JVLR crossing Western Express Highway in the year 2016-17. A budget provision of Rs. 2Cr. is made for this work in the year 2016-17.
- 2) Jogeshwari (North) flyover is proposed to be extended crossing S.V. Road towards Linking road in the year 2016-17. Tendering procedure of these works will be completed in the next six months. This will ease traffic congestion in Western Suburbs. A budget provision of Rs.1Cr. has been made for this work in the year 2016-17.
- 3) A flyover is proposed at JVPD circle in Western Suburbs and provision of Rs.1Cr. is made for this work in the year 2016-17.
- 4) It is proposed to build flyover at south bond of Sangeetkar Sudhir Phadke Bridge in Borivali (West), Connection W.E.H. Budget provision of Rs.1Cr. is made for this work in the year 2016-17.
- 5) A flyover is proposed at Lakhandwala back road to Yari road, Amarnath tower. A budget provision of Rs.5 Cr. is made for this work in the year 2016-17.

Railway Oover Bridges :

The Hancock Railway Over Bridge is proposed to be reconstructed. The estimated cost of reconstruction is Rs.28 Cr. and the tenders have been invited. The approaches of Vikhroli Railway Over Bridge are being constructed by the MCGM. The estimated cost is Rs.39Cr. Also, the tenders for this work have been invited.





Ghatkoper-Mankhurd Lind Road:

The tender for construction of a major flyover of about 2.1 Km. long covering three major junctions namely Shivaji Nagar, Bainganwadi and Deonar dumping ground road junction, is being invited. This flyover consists of 3+3 lane having total width of 24.2m. This will give great relief to traffic jam in eastern suburbs. Rs.81Cr. is proposed in the B.E. 2016-17 for this work.

Future Projects:

1) Passenger water transport system along west coast:

Government of Maharashtra has appointed MSRDC as the nodal agency to implement this project from Nariman Point to Borivli on the west coast. Bids have been invited on BOOT basis for this work with terminal stations at Bandra, Juhu, Marve, Charkop and Versova.

2) Mumbai Trans Harbour Link:

This proposed project consists of India's longest sea bridge linking Sewree in Mumbai to Nhava in Navimumbai. Increasing development initiatives in southern Navimumbai (Eg. International airport, Nhava Sheva port, Special Economic Zones, etc.) will give rise to increasing traffic movement and accentuate the need for greater economic integration of Mumbai with mainland. This project is also expected to be catalyst of development of the city, direction to expand in greater area. This project consist of construction of various roads, reconstruction, development and widening, also flyover bridge, railway bridge and foot over bridge.

Several flyovers are constructed in the city by MMRDA which eased traffic to a great extent. A rail over bridge at Milan subway, helps road users to overcome the harrowing experience of monsoon season. 2 km long bridge is open for traffic from Western Express Highway to International airport under Jawaharlal Nehru National Urban Renewal Mission which is jointly funded by GOI, GOM, MMRDA and Mumbai International Airport Ltd. has been completed.

Surface Transport

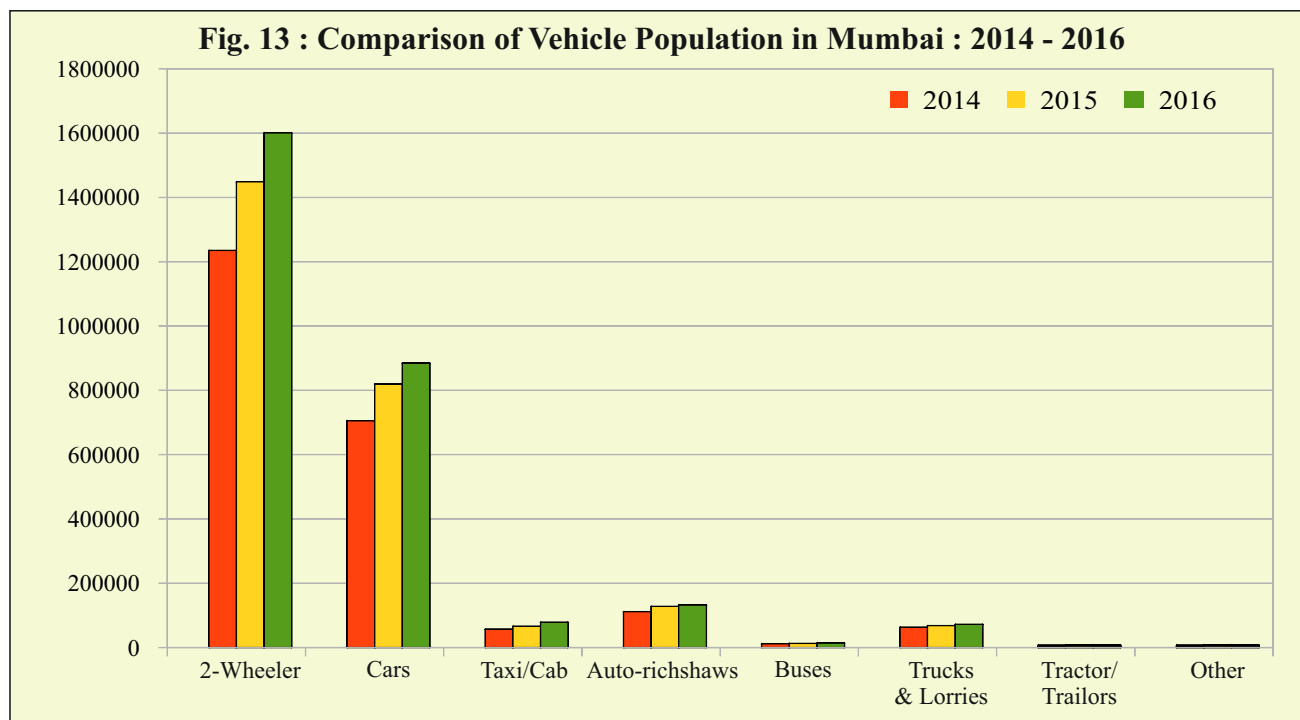
There are different types of vehicles plying on the roads of Mumbai. They consist of cars, taxis, trucks, buses, three-wheelers, two-wheelers etc. The total number of vehicles in Mumbai as on March 2016 is 27,86,512. Their composition is 57.46% two-wheelers, 31.76% cars, jeep & station wagon, 2.82% taxis/cabs, 4.75% auto rickshaw, 0.51% buses, 2.60% Goods vehicles, 0.01% tractors/trailers and others 0.10%. Table no. 23 shows number of different vehicles in Mumbai.

There are 78,473 metered taxis in Mumbai operating on petrol, diesel, CNG and LPG as on 31st March 2016. CNG and LPG which are regarded as clean fuel. More than 65% meter taxis and 100% rickshaws are running on clean fuel CNG and LPG.

Table 23 - CATEGORY-WISE COMPARISON OF VEHICLE POPULATION IN THE CITY: 2014 - 2016

Sr. No.	CATEGORY	UP TO 31 ST MARCH		
		2014	2015	2016
1	TWO-WHEELERS	1235282	1448759	1600998
2	CARS, JEEPS, STATION WAGONS	705552	819828	884882
3	TAXI/CABS	57095	66130	78473
4	AUTO RICKSHAWS	111591	128120	132424
5	BUSES	11902	12754	14282
6	TRUCKS & LORRIES	63095	68115	72309
7	TRACTORS/TRAILERS	296	299	298
8	OTHERS	2585	2744	2846
	TOTAL	2187398	2546749	2786512

Source : This information is received from RTO,GOM



**Table 24 - CATEGORY-WISE VEHICLES USING VARIOUS FUEL TYPES
AS ON 31st MARCH 2016**

Sr. No.	CATEGORY	DIESEL	PETROL	LPG	CNG	OTHERS	TOTAL
1	TWO-WHEELERS	0	1600998	0	0	0	1600998
2	CARS, JEEPS, STATION WAGONS	236535	577930	9913	60504	0	884882
3	TAXI/CABS	17191	9904	1324	50054	0	78473
4	AUTO RICKSHAWS	0	0	0	132424	0	132424
5	STAGE CARRIAGES	3348	0	0	1916	0	5264
6	CONTRACT CARRIAGES	4142	90	0	683	0	4915
7	TRUCKS, LORRIES, TANKERS	7957	0	0	419	0	8376
8	AMBULANCES	945	564	1	92	0	1602
9	SCHOOL BUSES	581	421	0	2017	0	3019
10	PRIVATE SERVICE VEHICLES	928	5	2	149	0	1084
11	TRAILERS	96	0	0	0	0	96
12	TRACTORS	201	0	0	0	0	202
13	DELIVERY VANS (4-WHEELERS)	22851	1416	393	2568	0	27228
14	DELIVERY VANS (3-WHEELERS)	29574	4842	218	2059	0	36693
15	OTHERS	1205	8	0	0	0	1213
	TOTAL	325555	2196178	11851	252885	0	

Source: Transport commissioner, GOM

To control the air pollution due to automobiles, various measures are initiated. One of them is to carry out "Pollution Under Control" (PUC) test. This is mandatory for vehicles every six months. Transport department of government of Maharashtra detects cases of violation of pollution laws and fines the defaulters.

In Mumbai to reduce auto exhaust pollution central government has introduced registration of vehicles fulfilling Bharat-IV norms and in rest of areas vehicles fulfilling Bharat-III norms will be registered.





Municipal Corporation of Greater Mumbai

The PUC checks, unleaded petrol, low Sulphur diesel and catalytic converters have been found to be very effective in controlling air pollutants like particulates, Lead, Sulphur dioxide, Carbon Monoxide, Hydrocarbons, Oxides of Nitrogen, etc.

To reduce the air pollution in Mumbai, it is essential to encourage public transport like railways and buses, follow the system of car-pooling by car owners, introducing bicycle lane and regular checkup of vehicles for PUC.

Vehicle in Mumbai as on March 2016 there are 2786512. Out of which 65% of Taxis and 100% rickshaws uses clean LPG/CNG fuel.

HOUSING AND SLUMS

The population of Mumbai is more than 12 million, out of which 60% of the population resides in the hutments. It creates burden on environment and many health problems. Mumbai Slum Improvement Board provides amenities in various slums in Mumbai city and suburbs. Majority of the people residing in the hutments are from economically and socially weaker stratum. Span of slum redevelopment plan of State Government is extended to provide permanent residence and civic amenities. The main purpose of this project is to provide residence, basic amenities and other related civic amenities.

Mumbai Slum Development Board has planned construction program regarding basic amenities for the year 2015-16 as given below.

1) Construction of protection wall. (2) Improvement plan for civic backward colony. (3) Development plan for slum area. (4) Plan for beautification. (5) Development plan for crematorium. (6) To provide facilities to citizens in area under MCGM. (7) Member of parliament/MLA/Apposite party members. (8) Development of tourist places. (9) New plans/ Ladies saving group/ Water tank protection/ Borewell.

The proposed by MP/MLA as per the above plan. Administrative sanctions for these works is received from the office of collector city district/urban district. The works done under the Mumbai slum development board are carried out by the financial source from D.P.D.C., M.M.R.D.A and Government special fund.

EDUCATION

Education is the important basic need to increase general awareness. Education at School level improves the knowledge of students about protection and conservation of Environment which makes them responsible citizens.

Under section 61(q) of the Mumbai Municipal Corporation Act 1888, it is an obligatory duty of the Corporation to provide primary education. Education Department of MCGM has been carrying out this responsibility since 1907.

In the academic year 2015-16, Education Department of MCGM runs 1083 Municipal primary schools in 8 different medium and 3,50,241 students are studying in these schools. There are 795 students in 17 schools. There are schools for mentally challenged. MCGM started English medium Mumbai Public Schools since year 2007-2008, wherein the educational facility is made available right from Junior KG. Education department also regulates the Private Primary Schools by giving them recognition through registration.

As per rules and directives of Maharashtra State Government, Right of Children to Free and Compulsory Education Act, 2009 is being implemented.

In addition to primary education, MCGM runs Secondary schools since 1965. At present, 49 aided secondary schools are providing free secondary education. Efforts are being made to provide additional facility of free secondary education by starting 99 secondary schools on Un-Aided basis, since 2008-09. In all, 38,751 students are studying in secondary schools. MCGM runs 2 D.T.Ed. colleges. For higher education Students who score high percentage in SSC examination, 3 Junior colleges of Science faculty have been started since 2009-10.



For the students in MCGM Schools, activities emphasizing the importance of health and environment are included in day-to-day learning-teaching process.

- Head Masters, teachers and non-teaching staff of the schools take care to maintain healthy school atmosphere.
- Necessary items required for the students are provided by Education dept. of MCGM, free of cost. The tender process of required articles for the year 2015-16 is being carried out at CPD (Byculla).
- Education related to Environment and Health is given to students through school subjects.
- To protect Health, Hygiene and good atmosphere for the students as well as to protect student from disturbances by outside people, MCGM has appointed private contractors to Provide Services of Maintenance, Cleanliness and Security of School buildings.
- Students of Municipal Schools undergo regular free medical check- up by the Medical Officer of MCGM. Students with minor ailments are treated in the School or referred to near by municipal dispensaries. Those with major ailment are referred for medical/surgical treatment to nearby municipal hospitals or school clinics situated at Nair hospital/Coopar hospital and Nair Dental hospital where they are treated free of Cost. Students with defective vision are provided Spectacles free of Cost. Students with heart ailments are provided financial assistance for corrective Surgeries. Children with disability are identified and corrective aids such as hearing aid, Wheel Chair, Jaipur foot etc. are given with the help of funds from 'Sarva Shiksha Abhiyan.'
- Services and facilities are provided to students under “Children with special need” on Medical check up (CWSN). During the period of 2015-16 services and facilities for blind, dumb and deaf, mentally challenged, handicapped, physically disordered etc. are provided with Spectacles, Traveling Allowance, Assistance Allowance, Therapy Service, M.R. Kit, Hearing Aid, Wheel Chair, Crutches, Braille Books, Tricycle, Rolator as per requirements.
- MCGM Education Department organized drawing competition on topic 'Clean Mumbai, Green Mumbai'. Mayor Drawing Competition, which was held at various grounds and gardens, 56,388 students participated and 24 students were given prizes.
- 156003 students have been taken part in drawing competition under 'Cleanliness Drive'. 360 successful students have been awarded by trophies.

In the academic year 2015-16, Education Department of MCGM runs 1083 Municipal primary schools in 8 different medium and 3,50,241 students are studying in these schools.

AIR QUALITY STATUS

To measure the levels of pollutants in Mumbai, Air Quality Monitoring & Research Lab of MCGM has established manual and fixed air pollution monitoring sites at, Worli, Khar, Andheri, Bhandup and Maravali. Automatic monitoring sites are at Worli, Wadala and Andheri Traffic Junctions by using mobile van.

Air Monitoring Sites

Sr. No.	Site	Located at
1	Worli	Transport dept. Building, E. Moses Rd., Worli
2	Khar	Municipal Dispensary Bldg., S.V.Rd, Khar(W)
3	Andheri	Nityanand Marg Municipal School Bldg., Koldongari, Andheri (w)
4	Bhandup	S ward office Bldg. m, L.B.S.Rd, Bhandup (w)
5	Maravali	Maravli Municipal School bldg., Kurla Mahul Rd., opp RCF, Chembur.





Environment department of MCGM monitors ambient air quality for criteria air pollutants namely Sulphur Dioxide (SO₂), Nitrogen Dioxide (NO₂), Ammonia (NH₃), Suspended Particulate Matter (SPM) parameters regularly. Air quality levels are evaluated in the year 2015-2016 for its compliance with ambient air quality standards set by Central Pollution Control Board for SO₂, NO₂, NH₃ and SPM. (Table 25)

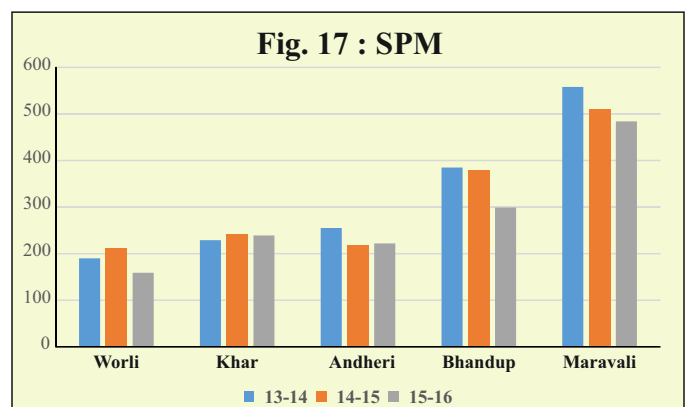
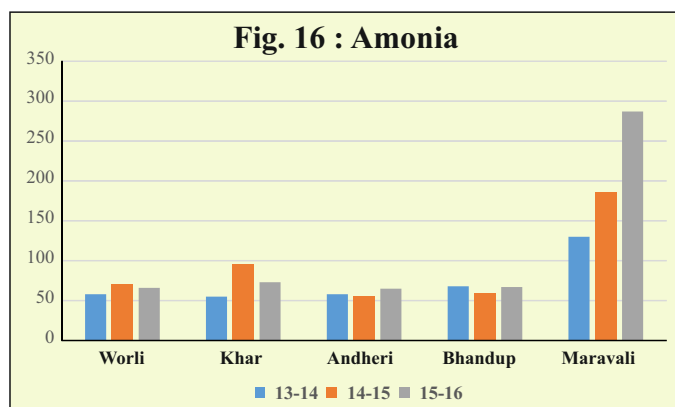
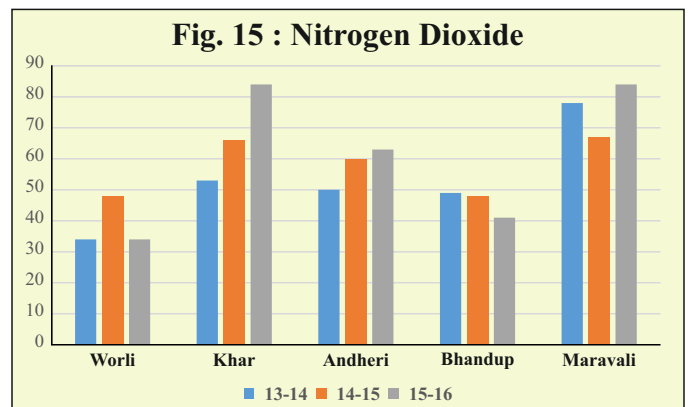
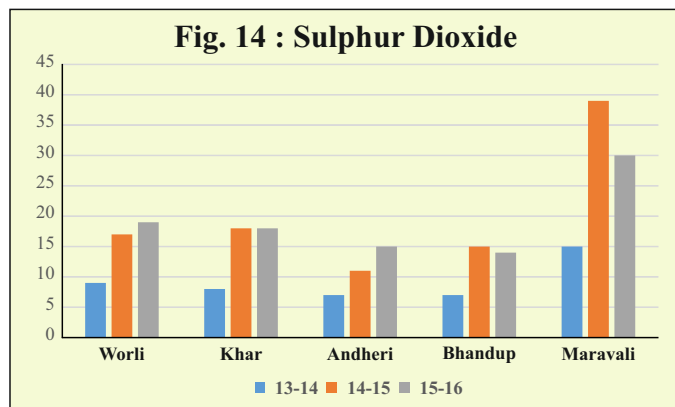
Comparison with standards prescribed by Central Pollution Control Board :

Levels of air pollutants SO₂, NO₂, NH₃ and SPM measured during 2015-16 are compared with standards set by Central Pollution Control Board (CPCB) observations are as under.

- 1) SO₂ levels are found less than prescribed annual standards at all fixed monitoring stations.
- 2) NO₂ levels are found more than prescribed annual standards at all fixed monitoring stations except Worli.

Table No. 25 Ambient Air Quality Levels at fixed monitoring sites (Annual average) April 2013 to March 2016.

Sr. No.	Site	Unit µg/m ³											
		Sulphur dioxide			Nitrogen dioxide			Ammonia			SPM		
		2013-14	2014-15	2015-16	2013-14	2014-15	2015-16	2013-14	2014-15	2015-16	2013-14	2014-15	2015-16
1	Worli	9	17	19	34	48	34	58	71	66	190	212	159
2	Khar	8	18	18	53	66	84	55	96	73	229	242	239
3	Andheri	7	11	15	50	60	63	58	56	65	255	217	222
4	Bhandup	7	15	14	49	48	41	68	60	67	385	378	299
5	Maravali	15	39	30	78	67	84	130	186	287	558	509	484
CPCB Standards µg/m³		50			40			100			140		





- 3) NH₃ levels are found less than prescribed annual standards at all fixed monitoring stations except Maravali.
- 4) SPM levels are exceeding the prescribed annual standards at all fixed monitoring stations.

Table No. 26 : Comparison with CPCB Std. (2015-16) at fix monitoring site (Annual average)

Sr. No.	Unit $\mu\text{g}/\text{m}^3$	Sulphur dioxide	Nitrogen dioxide	Ammonia	SPM
1	Range	14 – 30	34 – 84	65 – 287	159 – 484
2	Maximum	Maravali	Khar, Maravali	Maravali	Maravali
3	CPCB standards	50	40	100	140
4	Comparison with CPCB standards	Not exceeded	Exceeded at Khar, Andheri, Bhandup & Maravali	Exceeded at Maravali	Exceeded at all sites

Comparison of Annual Averages with CPCB Standards :

When annual average are compared with CPCB standards following observations are noted.

- 1) SO₂ levels are found to be in the range of 14-30 $\mu\text{g}/\text{m}^3$ and are below prescribed standard (50 $\mu\text{g}/\text{m}^3$) at all sites. Maximum SO₂ level is found at Maravali.
- 2) NO₂ levels are found to be in the range of 34-84 $\mu\text{g}/\text{m}^3$ and have exceeded standard 40 $\mu\text{g}/\text{m}^3$ values at Khan, Andheri, Bhandup, Maravali sites and found maximum at Maravali.
- 3) NH₃ levels are found to be in the range of 65-287 $\mu\text{g}/\text{m}^3$ and have exceeded standard 100 $\mu\text{g}/\text{m}^3$ at Maravali.
- 4) SPM levels are found to be in the range of 159-484 $\mu\text{g}/\text{m}^3$ and have exceeded standard 140 $\mu\text{g}/\text{m}^3$ at all sites.

Comparison of 24 hours average with CPCB Standards :

Percentage at monitoring sites exceeding CPCB standards (24 hours average) 2015-16:

Table No. 28

Sr. No.	Site	Sulphur dioxide			Nitrogen dioxide			Ammonia		
		2013-14	2014-15	2015-16	2013-14	2014-15	2015-16	2013-14	2014-15	2015-16
1	Worli	0	0	0	3	19	1	4	0	0
2	Khar	0	0	0	30	32	60	2	5	0
3	Andheri	0	0	0	20	36	33	11	0	1
4	Bhandup	0	0	0	5	15	7	2	0	0
5	Maravali	0	0	1	43	33	52	8	10	16

Comparison of Percentage exceeding 24 hours average with CPCB standards shows following observations :

- 1) SO₂ levels in ambient air have not exceeded the 24 hrs standards set by all monitoring stations. At Maravali 1% samples are exceeding standards.
- 2) NO₂ levels exceeded standards set by CPCB at all monitoring stations. At Worli 1%, Khar 60%, Andheri 33%, Bhandup 7% and Maravali 52% samples are exceeding standard.
- 3) The levels of NH₃ exceeded at Andheri by 1% and at Maravali 16% as per standard set by CPCB except Worli, Khar and Bhandup.

When compared with last year, it is observed that in 2015-16 there is a small difference in the levels of sulphur dioxide, nitrogen dioxide, ammonia and suspended particulate matter. Due to improvement in the basic





infrastructure i.e. cement concrete roads, widening of road, flyovers proper control of signal, proper coordination and improvement in traffic control, idling of vehicles is reduced. The emission of pollutants is reduced because of strict implementation of PUC and Bharat-III & IV and modern technology is in new vehicles.

Table 22
NATIONAL AMBIENT AIR QUALITY STANDARDS
CENTRAL POLLUTION CONTROL BOARD, NEW DELHI
(18th November, 2009)

Parameter	Exposure Period	Industrial, Residential, Rural & Other Area	Sensitive Area
Sulphur Dioxide, SO ₂ , µg/m ³	Annual avg.*	50 µg/m ³	20 µg/m ³
	24 Hrs avg.**	80 µg/m ³	80 µg/m ³
Nitrogen Dioxide, NO ₂ , µg/m ³	Annual avg.*	40 µg/m ³	30 µg/m ³
	24 Hrs avg.**	80 µg/m ³	80 µg/m ³
Particulate Matter (Size less than 10µm), PM ₁₀ , µg/m ³	Annual avg.*	60 µg/m ³	60 µg/m ³
	24 Hrs avg.**	100 µg/m ³	100 µg/m ³
Particulate Matter (Size less than 2.5µm) PM _{2.5} , µg/m ³	Annual avg.*	40 µg/m ³	40 µg/m ³
	24 Hrs avg.**	60 µg/m ³	60 µg/m ³
Ozone, O ₃ , µg/m ³	8 Hrs**	100 µg/m ³	100 µg/m ³
	1 Hr,**	180 µg/m ³	180 µg/m ³
Lead, Pb, µg/m ³	Annual avg.*	0.50 µg/m ³	0.50 µg/m ³
	24 Hrs avg.**	1.0 µg/m ³	1.0 µg/m ³
Carbon Monoxide, CO, mg/m ³	8 Hrs**	2.0 mg/m ³	2.0 mg/m ³
	1 Hr,**	4.0 mg/m ³	4.0 mg/m ³
Ammonia, NH ₃ , µg/m ³	Annual avg.*	100 µg/m ³	100 µg/m ³
	24 Hrs avg.**	400 µg/m ³	400 µg/m ³
Benzene, C ₆ H ₆ , µg/m ³	Annual avg.*	5.0 µg/m ³	5.0 µg/m ³
Benzo alpha Pyrene, Particulate Phase only BaP, ng/m ³	Annual avg.*	1.0 ng/m ³	1.0 ng/m ³
Arsenic, As, ng/m ³	Annual avg.*	6.0 ng/m ³	6.0 ng/m ³
Nickel Ni, ng/m ³	Annual avg.*	20 ng/m ³	20 ng/m ³

* Annual arithmetic mean minimum 104 measurements in a year at a particular site taken twice a week 24 hrly at uniform interval.

** 24 hrly / 8 hrly values should be met 98% of the time in a year, however, 2% of the time, it may exceed but not on two consecutive days.

NOTE:

1. National Ambient Air Quality Standard: The levels of air quality necessary with an adequate margin of safety, to protect the public health, vegetation and property.
2. Whenever and wherever two consecutive values exceed the limit specified above for the respective category, it would be considered adequate reason to institute regular / continuous monitoring and further investigations.
3. The State Government/ State Board shall notify the sensitive and other areas in the respective states within a period of six months from the date of Notification of National Ambient Air Quality Standard





Automatic air quality monitoring at Traffic junctions:

Table No. 29 Annual levels of SO₂, NO₂, NH₃, RSPM, CO at traffic junctions 2013-2016

Site	Sulphur dioxide			Nitrogen dioxide			SPM PM ₁₀			SPM PM _{2.5}			Carbon Monoxide		
	13-14	14-15	15-16	13-14	14-15	15-16	13-14	14-15	15-16	13-14	14-15	15-16	13-14	14-15	15-16
Worli	11	13	-	44	45	-	150	148	-	68	52	-	1	1.1	-
Wadala	12	15	6	45	50	54	161	194	211	50	56	284	1	1.1	1
Andheri	8	13	8	59	62	83	95	190	194	46	80	244	1	1	1.1

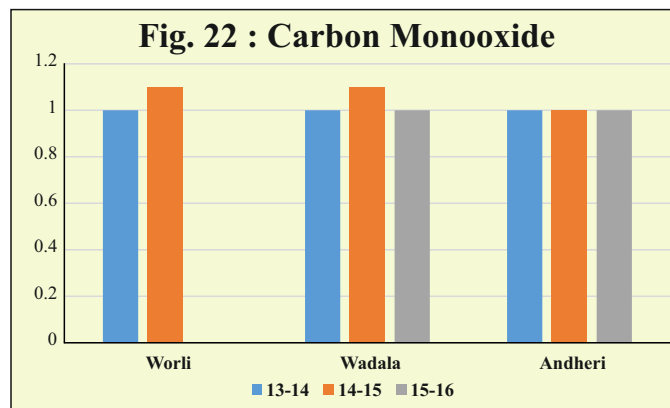
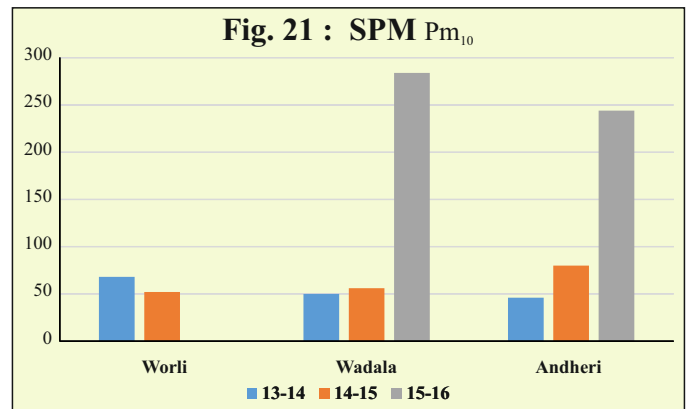
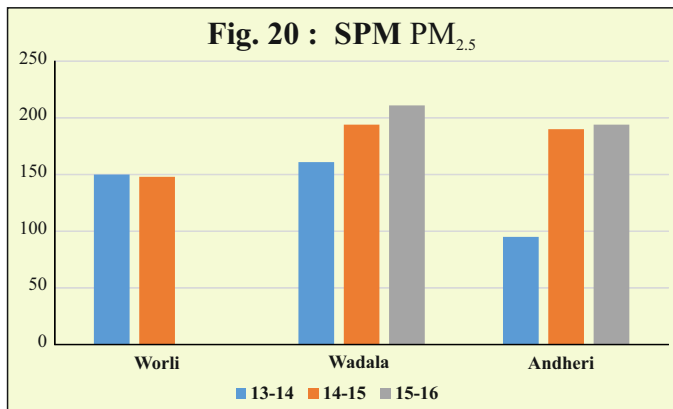
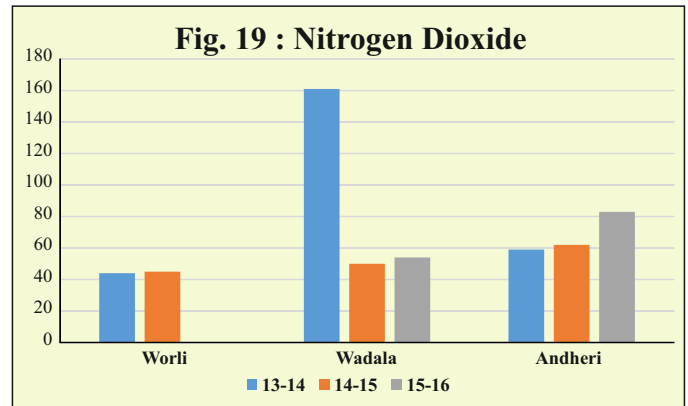
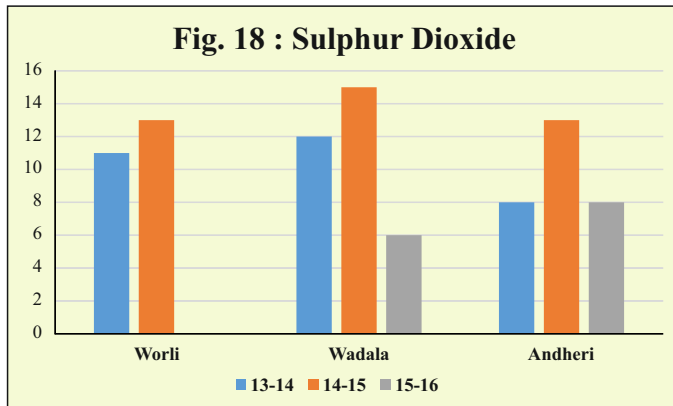
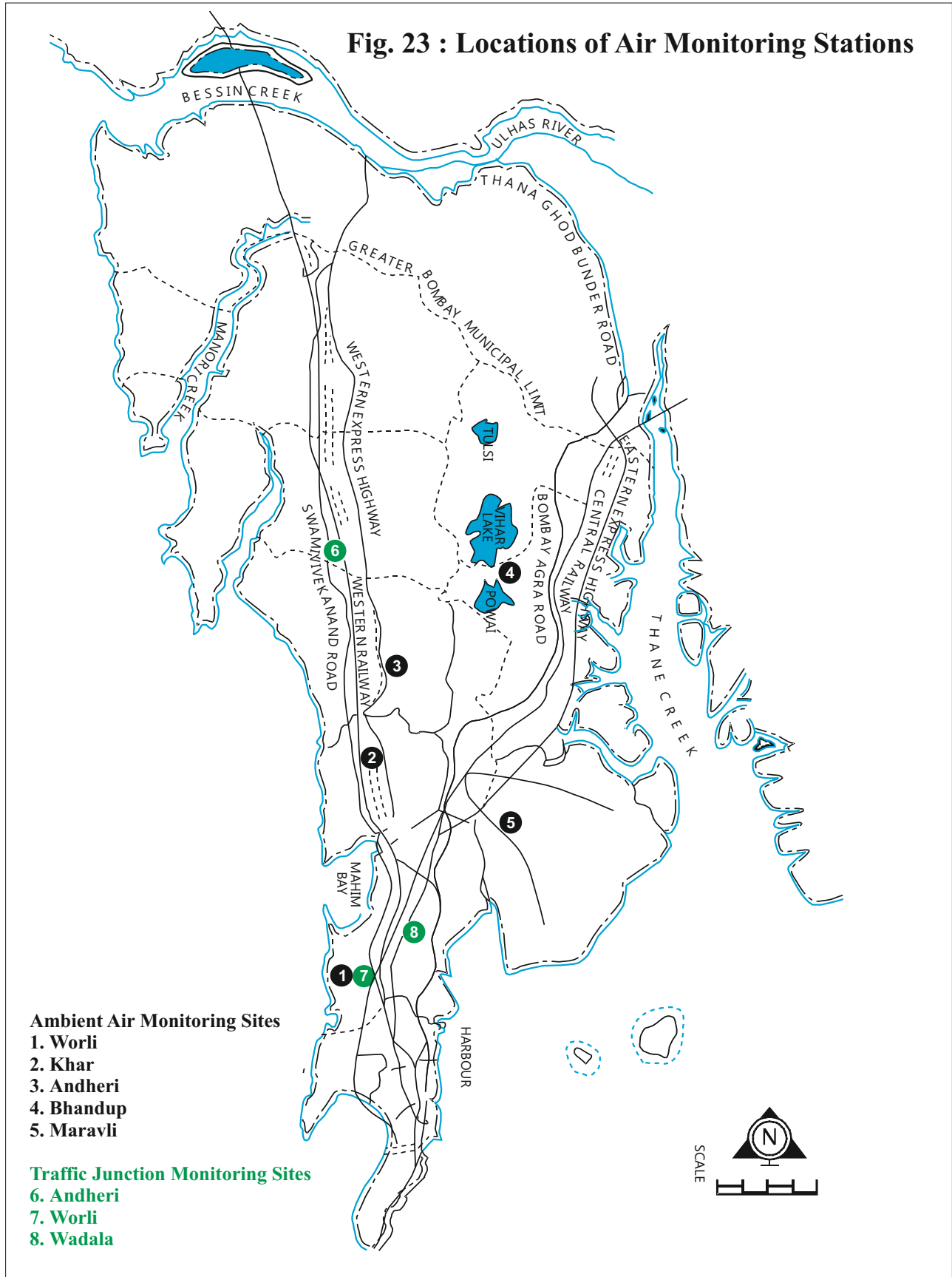




Fig. 23 : Locations of Air Monitoring Stations





Air quality levels have been monitored at various traffic junctions using mobile air quality monitoring van. The study indicates (Table 29) following variations in their annual levels when compared to previous year.

Levels of Sulphur dioxide are less compared to last year.

1. Sulphur dioxide levels have decreased compare to last year.
2. Nitrogen dioxide levels have increased compare to last year.
3. Levels of RSPM viz PM₁₀ & PM_{2.5} have increased compare to last year.
4. In case carbon monoxide levels there is no significant difference.

Generally levels of air pollutants show decreasing trend in monsoon and increasing trend in winter season. Air pollutants are washed out along with rain water and south west direction of wind arriving from sea. Due to low speed of the wind and less temperature in winter season mixing of the pollutants from ground level to air at higher level is minimum. There are more industries in North East part of Mumbai. Because direction of the wind is North, East in winter season pollution levels show rise in Mumbai.

Control of air pollution-legal aspects:

Municipal Commissioner has been vested with power as per MMC Act 1888, under sections 381, 390, 394, 471, 472 to discharge certain obligatory and discretionary duties. MPCB is empowered to enforce the provisions of different Acts like Water Act, Environment Act, etc. Both agencies co-ordinate with each other to control pollution using these powers. The environment department suggests the control measures while scrutinizing the proposals submitted to MCGM. Authorities deal with various aspects of factories/ industries such as expansion, changes of fuel, change in manufacturing activities, installation of steam boilers, diesel generators, electric furnaces, ovens, oil fired furnaces, chimneys, etc. The proposals for additional water and electricity required for pollution control measures are also scrutinized and no objection certificates for them are issued so as to enable the applicants to fulfill the requirements. The respective ward offices ensure the compliance to the control measures suggested by environment department of MCGM. The licenses/ permits are either not renewed or revoked in case of non-compliance. The proposals of shifting of obnoxious and hazardous industries from non-conforming to conforming zones according to development plan provision are also checked.

SAFAR – Mumbai

System of Air Quality and Weather Forecasting and Research - 'SAFAR' for Mumbai was launched and dedicated to country on 23.06.2015.

Background:

Air, mixture of gases, is indispensable for survival of life on the earth. The imbalance of the constituents of this mixture results in deterioration of air quality and increases pollution. When the levels of pollutants exceed threshold limit, it affects human health, plants and animals. Indian Institute of Tropical Meteorology (IITM) Pune designed a specialized system to monitor air quality and disseminate the information to public.

Earlier SAFAR was launched for metro cities in 2010 & 2012 respectively in Delhi and Pune which is in operation. SAFAR-Mumbai was launched in June 2015, which is a joint venture of MCGM, IITM Pune and IMD. It provides location, specific information on current and 1 to 3 days forecast for air quality and weather parameters along with UV index in a public friendly format along with health advisories.(Table 30)

Table no. 30 : SAFAR Mumbai comprises of following products.

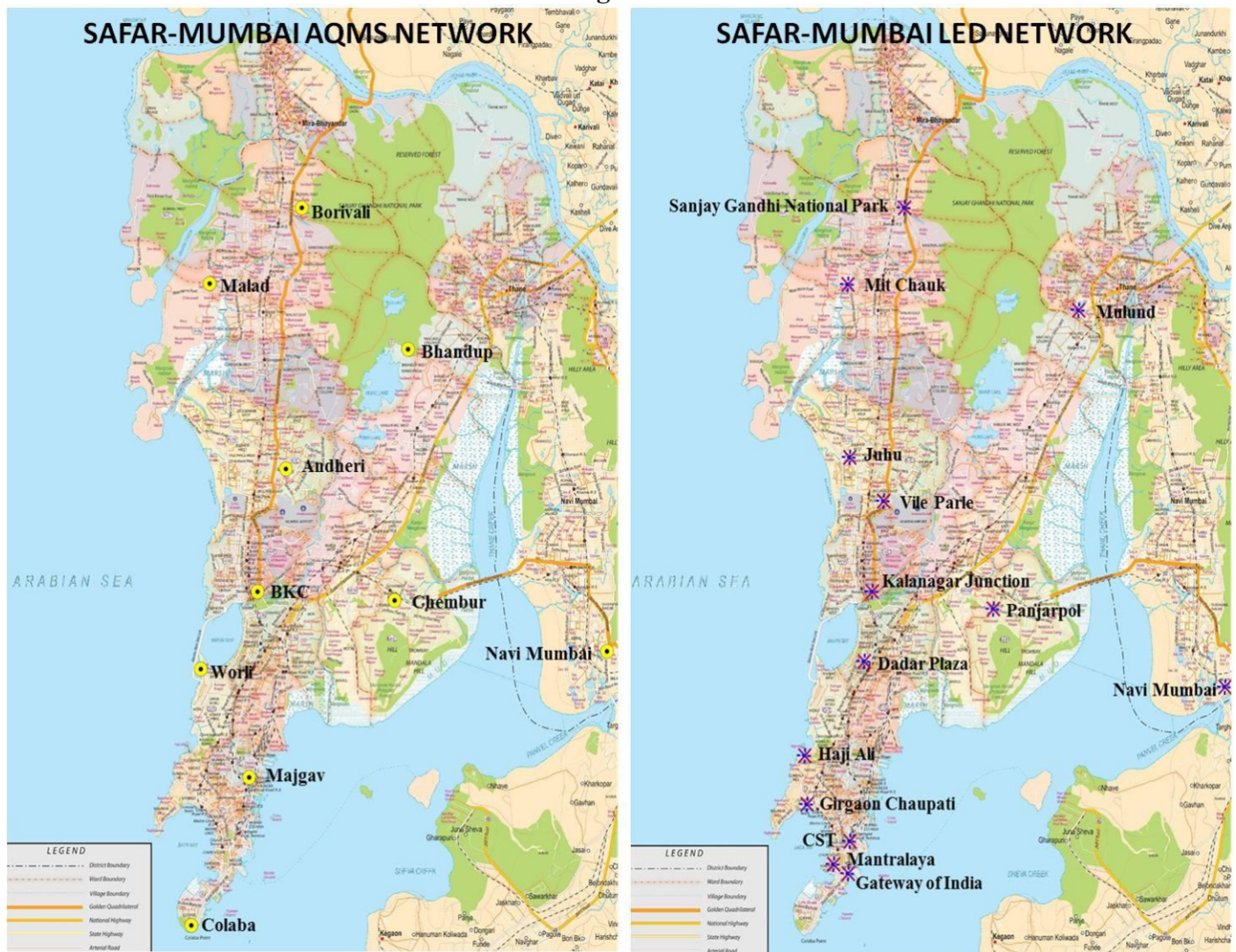
Sr. No.	Name of the Product	Nos.
1	Air Quality Monitoring Stations (AQMS)	10
2	Automatic Weather Stations (AWS)	30
3	LED, Digital Display Boards (DDS)	13

In Mumbai at various locations AQMS, AWS and LED Boards are installed to received information about current air quality and 1 to 3 days forecast





Fig. 24 :



SAFAR-Mumbai Information to Public:

Air pollutants viz. PM_{10} , $PM_{2.5}$, PM_{10} , Ozone (O_3), Carbon monoxide (CO), Nitrogen dioxide (NO_2), Sulphur dioxide (SO_2), Benzene, Toulene, Xylene, Mercury etc. are quantified and displayed on LED boards in terms Air Quality Index (AQI) along with health advisories (Table no.31). The real time AQI and forecasted AQI will help people to plan their outdoor activities so that they can prevent themselves from its adverse effects.

Meteorological parameter like Temperature, Rainfall, Relative humidity, Wind speed and Wind direction, High & low and alerts of severe weather conditions will be helpful to public, specially to fishermen.

Communication Media for Society:

SAFAR-Mumbai communicates with the society via,

- 1) SAFAR-AIR (Mobile app)
- 2) SAFAR-INDIA (Website)
- 3) LED System (Digital Display Boards)



1) SAFAR-AIR (Mobile App):

This is a mobile app which can be downloaded free of cost. The app provides location specific current and forecasted air quality index and UV index. The app is user friendly and will benefit common man.

2) SAFAR-India (Website):

This is a web portal (<http://safar.tropmet.res.in>) which can be accessed by people to collect location specific information.

3) LED Digital Display Boards (DDB):

3 x 1.80 Meter LED digital display boards are installed at sites for public viewing. Along with colour coded AQI, UVI and Health advisories environmental slogans will educate the citizens of Mumbai.

During July 2015 to March 2016 air quality levels are measured at various monitoring sites by 'SAFAR-Mumbai'. i.e. PM_{10} , $PM_{2.5}$, O_3 , CO and NO_2 etc. as shown in Table no. 31

Table No. 31 :

Sr. No.	Site	SPM		Ozone (O_3)	Carbon Monoxide (CO)	Nitrogen dioxide (NO_2)
		PM_{10}	$PM_{2.5}$			
		$\mu g/m^3$	$\mu g/m^3$			
				ppb	ppm	ppb
1	Chembur	135	86	22	0.8	32
2	Bhandup	138	89	29	0.7	28
3	BKC	135	104	18	1.1	42
4	Colaba	88	56	62	0.9	12
5	Andheri	148	104	21	1.2	22
6	Malad	98	75	25	0.8	16
7	Mazgaon	125	97	20	0.5	44
8	Worali	95	58	32	0.8	22
9	Borivali	105	62	23	0.5	27
CPCB Standard Annual Average		60	40	50 (8hrs)	1.75 (8hrs)	42.55

- 1) The annual average levels of Suspended Particulates (PM_{10}) are found to be in the range of 88-148 mg/m^3 . The maximum level of PM_{10} is observed at Andheri air monitoring station.
- 2) The annual average levels of Suspended Particulates ($PM_{2.5}$) are found to be in the range of 56-104 mg/m^3 . The maximum level of $PM_{2.5}$ is observed at BKC and Andheri air monitoring station.
- 3) The annual average levels of Ozone (O_3) are found to be in the range of 18-62 ppb. The maximum level is observed at Colaba.
- 4) The annual average levels of Carbon Monoxide (CO) are found to be in the range of 0.5-1.2 ppm. The maximum level of Carbon Monoxide is observed at Andheri.
- 5) The annual average levels of Nitrogen Dioxide (NO_2) are found to be 12-44 ppb. The maximum level of Nitrogen Dioxide is observed at Mazgaon.

Air Quality Index (AQI) :

Honorable Minister for Environment, Forests and Climate change, launched the national Air Quality Index (AQI) in New Delhi, on 17th September 2014 under the 'Swachh Bharat Abhiyan'. It is outlined as 'One





number-One colour-One description' for the common man to judge the air quality in his vicinity.

The current measurement of index is made comprehensive by the addition of 5 more parameters to the existing 3 parameters, i.e. in total 8 parameters are considered. AQI is a tool for effective dissemination of air quality of that area to common person. The information provided on air quality is in simple linguistic terms that is easily understood by people. The AQI is calculated by comparing the measured ambient concentration of the pollutant to the National Ambient Air Quality Standards (NAAQS).

There are six AQI categories, namely Good, Satisfactory, Moderately polluted, Poor, Very poor and Severe. The categories are shown in following table.

0-50	-	Green		-	Good
51-100	-	Light green		-	Satisfactory
101-200	-	Yellow		-	Moderately polluted
201-300	-	Orange		-	Poor
301-400	-	Red		-	Very poor
401-500	-	Brown		-	Severe

During July 2015 to March 2016 air quality index are measured at various monitoring sites by 'SAFAR-Mumbai'.

SAFAR-AIR (Mobile App) is a mobile app which can be downloaded free of cost. The app provides location specific current and forecasted air quality index and UV index. The app is user friendly and will benefit common man.

NOISE LEVELS

Noise :

Noise is an unpleasant sound which produces unpleasant effects and discomfort on human ears. Noise does leave behind its effect and this can deteriorate after continued exposure to noise. The hazardous effect of noise depends on the intensity of sound (loudness in decibels), its duration and frequency (high or low). The effects are broadly classified as auditory effects and non auditory effects. Impairments of hearing (i.e. total deafness) is an auditory effect. Non auditory effects includes headache by dilating blood vessel of brain, increased heart rate/changes in the heart beat pattern, the respiratory reflexes where the respiratory rhythm tends to change, effect on digestion by slowing the peristaltic movements, narrowing of arteries, disturbance in concentration, effect on memory, muscular strain, nervous breakdown, depression, fatigue, insomnia, interference with speech intelligibility etc.

The noise pollution (regulation and control) rules, 2000 published by Ministry of Environment and Forest, Government of India, came into effect from 14.02.2000.

The ambient air quality standards in respect of the noise levels are as follows:

Area Code	Categories of Area / Zone	Limits in dB(A) Leq*	
		Day time	Night time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40



- * “Decible (dB)” is a unit in which nose level is measured. Letter “A”, in dB (A) Leq, denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear.
- * Leq is level equivalent which is 'energy mean' of the nose level, over a specified period.
- * dB(A) Leq denotes the time weighted average of the level of sound in decibel on scale 'A' which is relatable to human hearing.

As per the Noise Pollution (Regular and Control) Rules, 2000 amended on 22.11.2000. Silence zone is defined as an area comprising not less than 100 meter around hospitals, educational institutions, courts and religious places.

In the year 2009, Government of Maharashtra vide Government Resolution (GR) ध्वनी प्र - २००९/प्रक्र - ९५/ताक-१ dt.21.04.2009 has resolved that police authority will be responsible for initiating legal actions in respect of violations of the Noise Pollution (Regular and Control) Rules, 2000 and Municipal Corporation will be responsible for demarcation of silence zones and displaying the same in their respective jurisdictions.

With reference to above GR and its subsequent amendment on 7th August 2009, Municipal Corporation of Greater Mumbai (MCGM) in the year 2009 had identified 1177 silence zone in all 24 wards of Mumbai. Subsequently in the year 2015 the silence zones are reviewed and list of 1537 silence zones are notified and published in the gazette of Maharashtra on 19 September 2015. Now, 1503 silence zones have been mapped ward wise which shows 100 m periphery around the location i.e. area under influence of respective silence zone. Balance 34 silence zone will be de-notified subsequently. These maps are now disclosed on MCGM portal along with the list of silence zone which shall be useful for citizens of Mumbai and also to the enforcement agency. The link of the same is :

<http://portal.mcgm.gov.in/irj/portal/anonymous/qenvironment>.

The silence zone categories at a glance in 24 wards under the jurisdiction of MCGM are as follows:

Sr. No.	Silence Zone Categories	Total Number of Silence Zone
1	Courts	20
2	Educational Institutions	922
3	Hospital	212
4	Religious places	349
	Total	1503

Noise mapping:

With reference to order passed by Hon'ble Chief Minister during meeting with Citizen Action Group on 12.09.2011, Municipal Corporation of Greater Mumbai (MCGM) has taken up a project of nose mapping of sensitive zones in its jurisdiction. About 1200 locations are selected and are classified in 16 various categories. These categories are Courts, Govt./Semi Govt./Corporate Offices, Major Hospitals, Major Schools, Major Colleges, Religious Places, Recreation Places, markets, Malls, Traffic Junction, Major Chowks, Tourist Spots, Residential Area, Industrial Areas, Railway Stations and Airport. The measurement of nose level will help to generate nose map of fairly good area under Mumbai city and suburbs and same shall be followed by suggestions with approximate cost of mitigation measures. Almost 50% of the work of measurement of sound levels is completed and rest of the work is expected to complete by January 2017.





INDUSTRIES

Environmental pollution is a by-product of industrialization. However, with the recent advances in the technology, pollution potential of industries is decreasing. The city of Mumbai has 30,152 working industries/factories. Covered under section 390 of Mumbai Municipal Corporation Act 1888, they pay Air Pollution Prevention Fees on the basis of horsepower of the connected load. There are 8,570 industries/factories located in the city, 14,176 in Western Suburbs and 7,406 in Eastern Suburbs, maximum industries 5,039 are in P-South ward. Ward-wise distribution of industries are shown in table no. 32

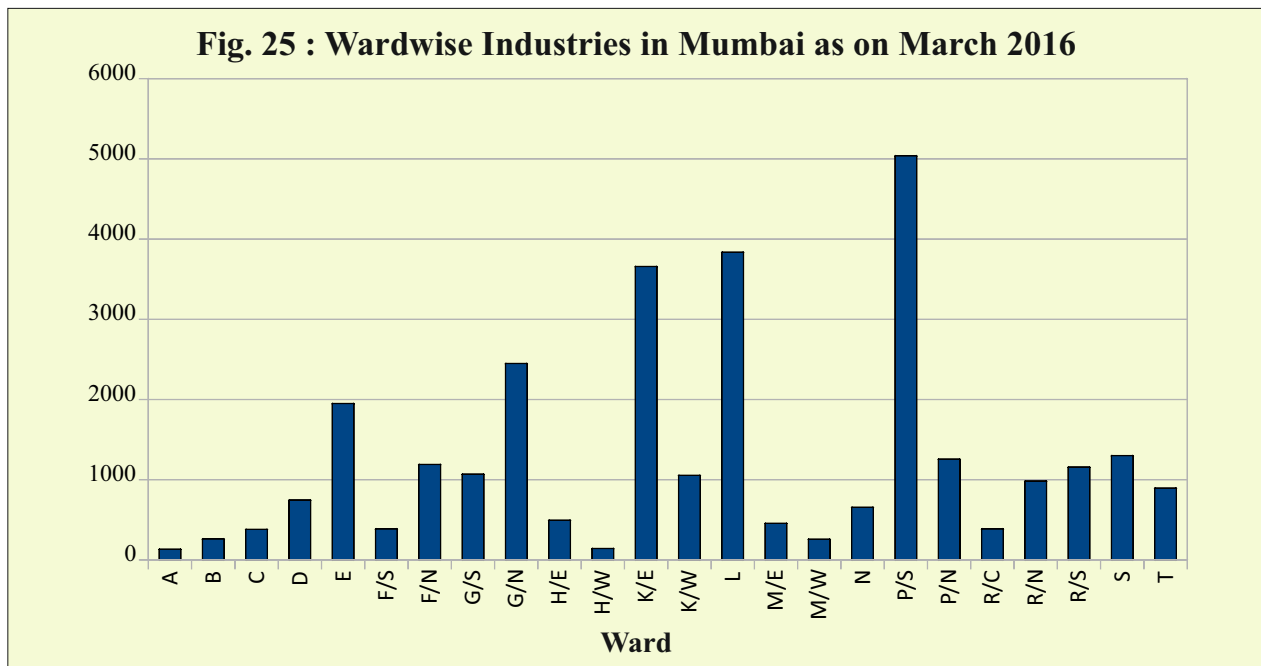
Industries are categorized by MPCB on the basis of emission levels. Heavily polluting industries are in “RED” category. e.g. Fertilizers, Petrochemicals, Pharmaceuticals, Cement, Thermal Power are some of the industries under RED category. “ORANGE” category industries are comparatively less polluting industries like Hotels and Restaurants, Fruit & Vegetable processing, Fish processing, Stone crushers, etc. Industries which are not in above two categories, are included in “GREEN” category. Some of the GREEN category industries are Mineral water, Salt mills, Ice cream, Handlooms, Candle industries, etc.

To control air pollution, measures such as cyclones, scrubbers, filters, electrostatic precipitators, etc. are adopted by existing industries. They also use clean fuel and better technology to produce the goods.

**Table 32
WARDWISE INDUSTRIES IN MUMBAI:
AS ON MARCH 2016**

Sr. No.	WARD	No. of industries
1	A	134
2	B	262
3	C	381
4	D	747
5	E	1950
6	F/S	386
7	F/N	1190
8	G/S	1070
9	G/N	2450
10	H/E	496
11	H/W	142
12	K/E	3659
13	K/W	1055
14	L	3837
15	M/E	457
16	M/W	259
17	N	657
18	P/S	5039
19	P/N	1257
20	R/C	387
21	R/N	983
22	R/S	1158
23	S	1301
24	T	895
Total		30152

Source : Building & Factory Dept., MCGM





The water pollution is control by treating waste water for its reuse. Industrial and domestic waste water under MCGM control and open nalla are treated to some extent and discharge into Arabian sea.

HEALTH

Health is the level of functional or metabolic efficiency of a living being. In layman terms, health usually means to be free from illness, injury or pain. The World Health Organization (WHO) defined health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. To lead and enjoy a wholesome life one must have sound health.

Environment contributes to the health of human being both in positive and negative ways. Better nutrition and clean environment will help to increase life span whereas polluted environment will cause deterioration of health. Environmental hazards are responsible for as much as a quarter of the total burden of disease world wide and more than a third of the burden among children. Environment plays a major role in etiology of numerous diseases like water borne diseases (Gastroenteritis, Jaundice), vector borne diseases (Malaria, Dengue, Chikungunya) and non-communicable diseases like Hypertension, Diabetes, etc.

In Mumbai, the MCGM largely takes care of Health Care Services. The State Government, Private organizations and Private medical practitioners also contribute in providing the health care services. Health care is a primary responsibility of MCGM. MCGM's health infrastructure in Mumbai is a 3-tier system as shown in the table no. 33.

HEALTH INFRASTRUCTURE 3 - TIER SYSTEM IN MCGM

PRIMARY	Health posts	204
	Dispensaries	169
	Maternity Homes	29
	Post-Partum centers	21
SECONDARY	Peripheral hospitals	16
	Specialty hospitals	5
TERTIARY	Major hospitals (Medical & Dental colleges) (5 main hospitals and 1 H.B.T. hospital joint with Cooper hospital).	6

Source: This information is received from Health Dept of MCGM

The health services are provided in two ways. On one hand there are hospitals, dispensaries and maternity homes all over the city catering to the medical needs of the people, while on the other hand there are outreach services. Under National Urban Health Mission 21 new health centre are started. Objective of establishing health centers is to provide health service for implementation of family welfare program and outreach services for mother and child.

Table No. 34 : Health Statistics- Birth & Death Rates

	Year 2013	Year 2014	Year 2015
Birth (Registered)	175208	174084	174902
Birth Rate/1000 population	13.97	13.83	13.83
Death (Registered)	89453	93254	94706
Death Rate/1000 population	7.13	7.41	7.49
Infant Mortality	4626	4883	4575
Infant Mortality Rate/1000 live birth	26.4	28.05	26.16
Maternal Death	278	299	313
Maternal Mortality Rate/1000 live birth	1.59	1.72	1.79

Source: This information is received from Health Dept of MCGM





Table no. 34 shows Birth & Death Rates and also Infant & Maternal mortality in the year 2013 to 2015. In year 2015 Birth rate in Mumbai was 13.83/1000 population and the Death rate was 7.49/1000 population in the year 2014. Infant mortality was 26.16/1000 and 1.79/1000 for mothers.

Epidemiology Cell

Office of Epidemiology Cell is situated in the campus of Kasturba Hospital for Infectious Diseases in ward no. 11. It started functioning from 25th April 2007.

Key activities of Epidemiology cell:

- 1) Disease Surveillance - Reporting of communicable diseases is done on weekly and daily basis. Information of admitted patients is received from all Municipal hospitals, Government Hospitals and major private hospitals. The reports are analyzed for monitoring the diseases trend and feedback is given to respective MOH for preventive measures in the community.
- 2) Water Quality Surveillance – Reporting of drinking water quality surveillance is monitored on daily basis from all 24 Wards.
- 3) Continuous liaison with other departments like IO, Municipal Analyst, IEC, Training and MIS as well as State & National authorities for prevention and control of communicable diseases.
- 4) Training of the Health Staff working under MCGM and sensitization of Private Health care providers.
- 5) During any outbreak of communicable disease, the Mobile Health Unit (MHU) team is made available to control further spread and containment of the disease in community.

Additional activities during Monsoon:

- 1) Control Room - In Monsoon, control room is set up on 1st of June every year for monitoring the monsoon related disease surveillance activities.
- 2) Health Camps - Special Sunday camps are organized in collaboration with secondary & tertiary hospital in high risk area of Mumbai. The reports of the same are analyzed and compiled to monitor the disease morbidity in the high risk pockets.
- 3) Medicines are made available for controlling the outbreak of communicable diseases.
- 4) Co-ordination is established between tertiary hospitals, Peripheral hospitals and major private hospitals for disease surveillance.

Preventive measures for monsoon related illness:

Vector borne diseases (Malaria/Dengue/Chikun gunya) :

Five Point Program 'Mumbai Mantra' is implemented for prevention and control of vector borne diseases.

- 1) Vector control measures: Source reduction, Engineering measures, Biological control, Chemical application and Legislative measures.
- 2) Early Diagnosis complete treatment – Finding out of fever patients by observation and root treatment as per 2013 National Medicine work system.
- 3) Micro mapping and planning
- 4) Intersectoral and Intrasectoral coordination.
- 5) Public awareness and implementation.

In addition to already existing 5 point programme for vector borne disease control measures, following special 5 point programme is implemented since 2012 for prevention and control of dengue.

- 1) Work place intervention.





- 2) Contact tracing.
- 3) Public awareness by co-ordination with Housing Societies.
- 4) Co-ordination with Private health care providers.
- 5) Special awareness in non slum areas.

Under Mumbai Arogya Abhiyan, special Sunday Health Camps are organized in high risk areas. In the year 2015, total 83 camps were held covering 34034 beneficiaries. At the camp site, IEC corner is established in which exhibition consisting of posters, live mosquito breeding, biological anti larval measures (Guppy fish) and models of mosquito breeding places are displayed for public awareness.

Dengue report

Year	Cases	Deaths
2012	1008	5
2013	927	11
2014	861	12
2015	919	8
2016 (up to 31 March)	66	0

Water Borne Diseases:

Outbreak and spreading of the common water borne diseases (Gastroenteritis, Typhoid and Hepatitis- A, E) occurs due to polluted water and food stuffs. To avoid water and food pollution following measures are taken.

- The drinking water samples are tested on daily basis from all 24 Wards by MOH, AEWQ-QC & AEWQ-LD.
- The A. E. Water Works at Ward level is informed about the unfit water samples and corrective steps for leak detection and repair is ensured by them and additional chlorination for water purification is carried out as per necessity.
- Areas reporting cases are surveyed by health post staff and following activities are carried out. Public awareness campaigns are carried out. Oral Rehydration Solution (ORS) & Chlorine tablets for additional chlorination is distributed. The patients detected during survey are referred to nearby dispensary for treatment.
- To control water borne diseases adequate stock of medicines and packets of Oral Re-hydration Solution are available in MCGM hospitals and dispensaries.
- For the public awareness, publicity in newspaper about water borne diseases and their remedies. In each ward food stuff kept open, over ripened fruits and food polluted by dust & flies, cold drinks regularly destroyed by Junior Investigator (Food)

H1N1 Influenza:

In 2015, two outbreak of H1N1 Influenza was reported in Mumbai, first in month of February and March and second in month of July and August.

Treatment facility such as Ventilators, Isolation ward, Oseltamivir medicine, personal protective equipments are made available.

Testing facility available in P.C.R. Laboratory Kasturba Hospital, Haffkine Institute and private lab (SRL)

H1N1 Report

Year	Cases	Deaths
2013	77	1
2014	11	1
2015	3029	52
2016 (up to 31 Mar)	1	0





Diagnostics, Metropolis lab, Dr Lal Path Lab). H1N1 vaccine is made available for medical and para medical staff working in isolation wards in Municipal hospitals.

For prevention and control of H1N1 in Mumbai following measures are undertaken by Health Department

- Public Awareness is being done through posters, banners, leaflets etc.
- Advertisement for awareness is being published in local newspapers.
- Advertisement banners on BEST buses and electric pole.
- Radio jingles giving messages were played on FM channels for public awareness.
- Awareness through cinema slides was done in Cinema halls.
- Helpline No. 022-24114000 is activated.

H1N1 Vaccination :

H1N1 vaccination facility for pregnant women of 2nd & 3rd trimester is made available at all 28 maternity homes and all 4 Medical college (Sion, KEM, Nair, & JJ) Kasturba Hospital of MCGM. H1N1 vaccination for high risk group of DM, HT patients is available at 7 MCGM dispensaries i.e. one each for 7 zone. H1N1 vaccination is also available for all health care worker of MCGM who are at risk.

Till 31.03.2016, H1N1 vaccination given to total 7756 beneficiaries, out of which 6201 are ANC of 2nd & 3rd trimester, 994 are Patient having both DM and HT, 22 are Patient having HT only, 98 were patient having DM only 441 were Health care worker of BMC.

Malaria

Following the surge of cases in 2010 the surveillance department has strengthened control measures of malaria by implementing “Mumbai Mantra” Five Point Programme.

- Effective vector control
- Early diagnosis, correct and complete treatment
- Micro-mapping and Micro Planning
- Inter and Intra Sectoral response
- Community awareness and action.

1. Early detection of cases and correct treatment :

- Strengthening Active and Passive Surveillance by detecting suspected cases through House Survey, surveys at construction sites, surveys at suspected malaria death case area, dispensaries and hospitals.
- Special camps on Sunday for fever cases and Baseline surveys at construction sites.
- Establishment of Linkage between health post, dispensaries and surveillance staff for detecting cases to give prompt and correct treatment and verification of Radical treatment. This activity is supervised by Senior Officers.
- All Malaria patients get radical treatment with follow-up and verification of Radical treatment.

2. Early and accurate diagnosis:

- For Diagnosis of Malaria, Laboratory facilities are available at 63 upgraded dispensaries, 18 peripheral hospitals, 4 medical college Hospitals, 5 Urban Health Centers. Apart from this, at Central Malaria Laboratory approx. 3500 blood slides daily examined and if required pre designated private labs are identified for maintaining ZERO BACK LOG Policy and within 24 hours timely reporting to MOH and PCO.
- To ensure quality of slide examination, some percent of blood slides are cross checked at central malaria lab and at Regional Government Lab.



3. Regular review meetings :

- To give feedback and proper guidance to ground level staff.
- To take review of preventive and curative activities.

4. Training :

- Organized for lab technician, malaria inspectors and investigator, Medical, Para-Medical staff and Private Medical Practitioners.
- Public Representatives, Safety officers and Supervisors at construction sites are sensitized for prevention and control of malaria.

5. IEC activities :

- Public awareness is carried out through display of Hoardings, Banners, Poster distribution of leaflets in the community. Electronic media such as Television, Short films and digital electronics board are used for public awareness.
- Malaria/Dengue Awareness Programme carried out with help of approx. 1000 to 1200 N.S.S. students of Mumbai University and an N.G.O. - United Ways during August 2015.

6. Joint Action :

- Line list of malaria cases is informed to PCO for mosquito control activity.
- Breeding sites are reported by PCO to MOH for detecting suspected cases from there.
- Before monsoon, at construction sites distribution of mosquito nets and instructions are given for medical examination of all workers to Developers as well as Health cards distribution and IRS is done by PCO.

Malaria Cases and Deaths:

Year	B.S. Collection	Cases	S.P.R.	Total Deaths
2013	1379048	10565	1.1	30
2014	1321977	9068	0.6	18
2015	1428265	7517	0.5	16
2016 (Up to March)	307248	857	0.2	0*

* Jan to March 2016 deaths are yet to be confirmed.

Source: This information is received from Health Dept of MCGM

Mumbai District AIDS Control Institute :

Mumbai District AIDS Control Society (MADCS), an Autonomous body registered under Charitable Trust Act was established on 27th July 1998 by MCGM for prevention and control of HIV/AIDS in Mumbai.

In a nutshell, MDACS's mission can be summed up as follows. All services are free of cost for the beneficiaries.

- 1) Prevent the spread of HIV/AIDS
- 2) Reduce the vulnerability of individuals and communities to HIV/AIDS.
- 3) Provide care and support to those infected and affected by the disease.

Mumbai district AIDS control society provides services free of cost through below mentioned divisions.

Basic Services:

Integrated counseling and HIV testing centers (ICTC) are established across the city in all Government/Municipal Hospitals/ Maternity Homes. These services are freely available to all walk – in/referred clients. Trained counselors and Laboratory Technicians perform HIV counseling and testing using standardized testing protocols with robust quality control





Anti Retroviral Therapy (ART):

Patients have availed of free ART services through 14 ART centers in the 5 medical colleges in Mumbai, 7 Peripheral Hospital, 2 private hospitals (Godrej hospital and L & T Hospital) and a specialized ART center for children at Sion hospital. So far 78825 patients are currently registered in HIV care and 31194 patients are on ART treatment in Mumbai.

Blood Safety Programme:

Preventing HIV transmission through infected blood by ensuring access to safe and adequate blood for the needy patients is one of the important services of MDACS. Government, Municipal and Trust blood banks in Mumbai are supported by provision of trained manpower, HIV testing kits and grants. All the blood units collected in the blood banks are tested for HIV, Hepatitis B, Hepatitis C and other blood borne infections. Regular voluntary Blood Donation Camps are organized in collaboration with Blood Banks and NGOs. Over the years, the numbers of voluntary blood donors have increased, significantly reducing the risk of HIV infection through blood transfusion.

Clinics to Control Sexually Transmitted Infections (STI):

Unsafe sexual behavior leads to transmission of Sexually Transmitted Diseases (STD) and infections including HIV. STDs can be easily diagnosed and effectively treated by syndrome treatment approach. For this, 26 Designated STI/ RTI clinics (DSRC) are set up throughout the city with trained doctors and counselors who educate the clients about complete treatment, condom usage, partner notification and partner treatment. The patients are also referred to ICTC for blood testing for HIV and STDs. Effective management of STDs and counseling on responsible sexual behavior at STI clinics helps in prevention of HIV transmission.

Targeted Intervention (TI):

Targeted interventions are aimed at offering prevention and care services to high risk populations of Female Sex Workers, Men having Sex with Men, Transgender and Injecting Drug Users. The bridge population of slum migrants and Long Distance Truckers are also provided with the information, means and skills to minimize HIV transmission. These high risk groups through their 28 NGOs /47CBOs are linked to appropriate testing and Treatment services.

Information Education & Communication :

IEC plays an important role in all prevention efforts. Various awareness campaigns are held using mass media and outdoor approach. Specially designed street plays and musical drama (Infotainment) activities are organized for slum migrants and high risk groups for reducing risk behavior.

Events are organized to increase the awareness among general population, especially for women and youth on various days viz. National Voluntary Blood Donation Day, National and International Youth Day, World AIDS Day, Women's Day.

Saadhan Helpline - Confidential Tele-counseling is provided on phone no. 022-24114000

Present Status :

HIV prevalence trend has witnessed a significant decline among general clients (11% in 2007 to 2.68% in 2015), Pregnant women (0.87% in 2007 to 0.21% in 2015) in Mumbai.

HIV testing at Integrated Counseling and Testing Centers of Mumabi	Tested	Positive
General Clients	283256	7590
Pregnant Women	110643	231

Treatment for HIV positive patients at ART Centers in Mumbai	Adult	Children	Total
Number of HIV Positive patients registered in active care	42914	2260	45174
Number of HIV Positive patients on Anti-Retroviral Treatment (ART)	29736	1458	31194



Acworth Municipal Hospital for Leprosy:

It was founded in the year 1890 by the then municipal commissioner Mr. H. A. Acworth and is located at R.A.Kidwai road, Wadala (West). It is under MCGM since 1991 as one of the specialized hospitals under the administrative control of Executive Health Officer.

Services provided by Acworth Municipal hospital for leprosy:

1) In Patient Service:

Presently the capacity of the hospital is of 240 cots. Majority of the abandoned, old and deformed inpatients are living in this hospital since many years. Hospital provides them food, clothes and place. The new patients not only get medical aid for leprosy and related diseases but also rehabilitation and welfare services by this hospital.

2) Out Patient Services:

Outpatient services include physiotherapy, social service, laboratory, dressing and pharmacy. Daily average OPD attendance is about 45 patients.

3) Occupational Programme:

Under National Leprosy Elimination Programme (NLEP), the hospital carries out leprosy monitoring, health, education and communication activities in municipal wards like 'E', 'F/South' & 'F/North'.

4) Reconstructive Surgeries:

Acworth Municipal Leprosy hospital is recommended and referred by state government where reconstructive surgeries are carried out for correction of deformities on leprosy patient.

5) Training :

Acworth Municipal Leprosy hospital provides training in leprosy is provided to allopathic and non allopathic graduates and post graduate also to nurses, microbiologists, welfare officers, physiotherapists and business therapists, sanitary inspectors etc. Government medical officers, non medical inspectors and laboratories also get trainings by this hospital.

6) Medical Audit:

Hospital prepares and preserves statistical audit to account the progress of National Leprosy Elimination programme.

7) Joint Project of Acworth Municipal Hospital and NGO's:

Acworth Leprosy Museum : This is the only museum in India which maintain scientific information of leprosy.

Footware Unit : Patient are provided with footware and splints in subsidized rates.

Leprosy Index Information and collection centre :

This centre helps to prepare programmes and micro action programmes.

Health Education :

Acworth Municipal Hospital provide health education to F/S, F/N, and E wards. Which helps to eradicate misconceptions about leprosy. Every year on the occasion of death anniversary of Mahatma Ghandhiji from 31st January to 5th February, leprosy education week is arranged by this hospital. During this week all active organizations effectively carry out public awareness and health education movement in their work premises.

Tuberculosis (TB):

Revised National Tuberculosis Control Programme (RNTCP):

Mumbai District TB Control Society, the Autonomous body, the unit of Mumbai Municipal Corporation, is formed under the Chairmanship of Addl. Municipal Commissioner for implementation of Revised National TB Control Programme (RNTCP) in jurisdiction of Mumbai since February 1999. The 58 Tuberculosis Unit, 144





Microscopy Centers and 347 DOTS Centers have been established in Municipal dispensaries, Health Posts, TB Clinics, Peripheral Hospitals and Medical Colleges. Total 4528 DOTS providers are functional in Public & Private Sector for administration of DOTS to TB patients. 24 NGOs, 3361 PMPs, 1134 Community Volunteers are involved in RNTCP as well as Railways, ESIS Hospitals, Mumbai Port Trust, BEST, Police, C.G.H.S dispensaries are also involved.

The TB patients are called on alternate days for first 2-3 months (intensive phase) and then once a week for next 6-8 months (continuation phase) for DOTS. The treatment for MDR patient is for 24-27 months with first 6 to 9 months of intensive phase and 18 months of continuation phase taken daily. Drugs are supplied from Central TB Division and are available at all DOTS centers free of cost. Mumbai district tuberculosis control institute purchases medicines for XDR TB patients.

For diagnosis of Multi Drug Resistance (MDR) TB, presently Mumbai has three culture and DST laboratories J.J. Hospital, Hinduja, SRL. To facilitate the rapid diagnosis of MDR TB, Gene Expert machines are installed at UHC Dharavi, Pt. Madanmohan Malviya Hospital Govandi. The capacity of laboratories at J.J. Hospital, Hinduja Hospital and S.R.L. Hospital is extended. Central TB Division has certified Hinduja Hospital Lab for 2nd Line DST has been made functional. Additional 3 Gene Expert machines are installed at Kurla Bhabha Hospital, Dr. Babasaheb Ambedkar Hospital Kandivali, Sewree TB Hospital. Facility of LPA laboratory is available at Sewree TB Hospital ensuring early diagnosis and subsequent treatment of MDR TB patients and it helps to prevent spreading of disease. For Mumbai city to control contagious diseases MCGM health department and contagious control committee are taking necessary control measures. Notification was started in Mumbai since January, 2012 with involvement of Hinduja, SRL, Metropolis, Holy Family, Breach Candy, and Jaslok Hospital laboratories. Under National Control Programme the information of MDR TB patients is provided to Mumbai district TB control Institute. Government of India has made notification of TB mandatory in 7 May 2012. Private medical professionals and private lab should register TB patients. In this connection district Tuberculosis Officer collects information regarding TB cases from private professionals every week and it is registered in 'NIKSHAYA', software of central TB division.

Environmental Pollution Research Center (EPRC):

To study health effects due to air pollution, Environmental Pollution Research Centre of KEM Hospital carried out Respiratory Morbidity Surveys of 2483 patients during 2015-16.

Respiratory morbidity assessment surveys are carried out based on complaints received from citizens of Mumbai regarding health effects related to air pollution. The studies carried out by the department are to find out cause and effect relationship of air quality and health in problems reported by the citizens. Health effects of various air pollutants monitored are studied by linking health impact to air quality. Research priorities include identification of susceptible subpopulations and mechanism of effect involved. Respiratory morbidity assessment was undertaken with questionnaire survey, clinical examination and by conducting lung function tests. This database will be used for planning health education measures in the community and preventive management strategies for future.

'Asthma' is a chronic inflammatory disorder of the airways which leads to reversible airway obstruction and significant respiratory morbidity if left untreated. Many environmental factors such as dust, smoke, chemicals, pollens, fungi can trigger asthma or other respiratory disorders like extrinsic allergic alveolitis. Environmental exposure is important causative factor.

According to the reports of Air Quality Status of Mumbai submitted by Air Quality Monitoring and Research Laboratory, Santacruz during 2015-16, Health Survey Team studied respiratory disorders in different areas of Mumbai.

The survey was carried out according to complaints received from citizens and workers for health effects due to air pollution.





EPRC surveys 2015-2016:

Sr. No.	Area	Group surveyed	Nos.	Remarks
1	Matunga Pumping Station	Workers	54	85.2% workers found healthy
2	B/Ward Solid Waste Management	Workers	139	95.7% workers found healthy
3	Bhandup Complex	Workers	103	82.5% workers found healthy
4	Mahulgaon,Chembur	Residents	406	53.3% residents found healthy
5	Pratikshanagar,Sion	Residents	530	85.2% residents found healthy
6	Tilaknagar	Residents	210	95.7% residents found healthy
7	Versova Pumping	Workers	190	95.8% workers found healthy
8	Deonar a) Nilkanth Apartments	Residents	596	86.4% residents found healthy
	b) Bainganwadi Kamala Raman Nagar & Rafiqnagar	Residents	255	51.9 & 62.1% residents found healthy respectively
	Total		2483	
	Asthma education	Total Number	1999	
	Lung function tests	Total Number	3931	
	Arterial blood gas study	Total Number	77,480	

On 29.01.2016 there was fire outbreak at Deonar dumping site. EPRC team visited Neelkanth gardens and carried out a health morbidity survey between 01.02.2016 to 05.02.2016.

In Neelkanth gardens 24.3% had complaint of choking 26.2% had cough and 17.8% had breathlessness. 57.9% people had complaint of eye irritation and 73.8%. were bothered by strong smell in the area. At Kamla Raman Nagar and Rafiq Nagar in Bainganwadi had complaint of choking sensation, 33.7% had cough, 23.3% had breathlessness and 48.8% had eye irritation.

The preventive measures should be taken for population residing near dumping grounds/landfill sites, stacks of industries Aspergillus fungus from Pigeon droppings are found on large scale at Mahim and Kala chowky in Mumbai and New Mumbai. It is a necessity to control diseases spreading through Pigeon dropping and dust exposure by environmental engineering control measures.

Recommendations:

1. Environment engineering control measures to prevent scientific landfill site related pollution exposure.
2. Measures to control Pigeon droppings related fungal antigen exposure in residential areas.
3. Health education and awareness regarding prevention & early diagnosis of asthma.

Biomedical waste:

According to bio-medical waste management and handling rules 1998 of India, Bio-medical waste means any waste which is generated during the diagnosis, treatment, immunization of human beings or animals or in research activities pertaining there to or in the biological test.

Uncontrolled and improper management and disposal of bio-medical waste has long been a major threat to public health and environment quality in developing countries. The waste produced in the course of health care activities carries a higher potential for infection and injury than any other type of waste. Inadequate and improper handling of health care waste may have serious health consequences and a significant impact on environment. Good waste disposal practices lead to reduction in medical expenditure, unsightly scenes at various disposal bins and dump sites and healthier society.





Programme Activities:

- 1) Segregation at source in yellow and red bags.
- 2) For hospitals, Nursing Homes, Maternity Homes, Health Posts, Bio Medical Waste is picked from source and transported by special vehicles to treatment facility run by SMS Envoclean.
- 3) Monitoring is done by Chief Engineer (SWM) department by cross checking with hospital whether Bio Medical Waste picked up by transporter.
- 4) Frequency for collection of B.M.W. for hospitals is daily or twice a day as per requirement, dispensary and health post is every 48 hours.
- 5) Medical and paramedical are given training in Biomedical waster management.

Other health services:

Health department of MCGM has a host of other programmes such as tuberculosis control, drug de-addiction, rabies control, etc. Health department of MCGM is also in charge of upkeep of the cemeteries all over the city.

Cattle pound staff raid to seize stray cattle and recover pound fees, feeding charges, etc. from the owners in addition to legal action against them. It also deals with food, sanitation and regulation of trades dealing with eatables. The MCGM also has a unique scheme of 'School Health Services' wherein primary and secondary school children are examined at regular intervals for rectification of defects and early treatment of any detected disease.

Helpline No. 022-24114000 is activated for prevention and control of H1N1 in Mumbai for public awareness.

DISASTER MANAGEMENT

In the year 1999 Disaster Management cell was setup at Municipal head office with specific aim of minimizing loss of life and property due to any disastrous situations that might occur anywhere within jurisdiction of Municipal Corporation of Greater Mumbai. This cell coordinates between various Aid agencies so as to provide quick and efficient medical services to victims by taking immediate and proper decisions. After devastating floods of 26th July 2005 this cell was equipped with ultramodern facilities and by providing services again from 30th May 2006.

This cell is working 24 x 7 hours basis of week, throughout the year and is provided with the following facilities.

- 1) Five Direct Telephone Lines
- 2) 51 MTNL Hot Lines with redundancy of TATA Hotlines connectivity with supporting agencies, main hospitals and all ward offices
- 3) Direct lines of 1916 for civic complaints & Emergency Help
- 4) A Very High Frequency (VHF) wireless communication system by which the Unit is connected to 58 installations for effective communication with key stakeholders and important agencies at all times to cater to any emergency
- 5) Direct feed of 219 Nos. of CCTV cameras installed at important Traffic junctions by Traffic Police and 10 Nos. of CCTV Cameras installed by MCGM at Chronic Flooding Spots.
- 6) Television sets which are tuned to major news channels to keep abreast of the latest news
- 7) Arrangement for installation of HAM radio on call.

The following types of complaints are registered in this Disaster Management Cell.



Minor and Major mishaps, Landslides, Tree falling or unauthorized cutting of tree, Water logging, House Collapse, Potholes on roads, Missing of manhole covers, Fire, Short-circuits, Flooding, Earthquakes, Bomb-blast etc.

Prompt note of above occurrences is taken and instructions are immediately conveyed to the officers concerned so as to provide essential services at the spot of occurrence.

MCGM has installed Automatic Weather Stations (Davis Make) at various 60 locations all over Mumbai and one flow meter at Mithi River, Powai. Out of them 56 AWS are connected at Emergency Operation Centre at MHO by dedicated WAN network. The data received from AWS includes rain intensity, temperature, humidity, wind speed, wind direction, etc. This data can be received at a present interval of time. The rainfall data is most important during monsoon, as warnings and alerts are issued to the staff and citizens of Mumbai based on it. During monsoon period a website called “www.dm.mcgm.gov.in” was launched by MCGM to display rainfall data. From the year 2014, this website will be available throughout the year. Inclusive monsoon period information received from 60 AWS viz. humidity, temperature, wind speed, wind pressure etc. Climate related information will be made available on this website. For this information “**mumbaimonsoon**” mobile application is developed which is free downloaded file for android and IOS.

Central Complaint Registration System: This system was introduced in the year 2000. The Control Room working for 365 days receives the complaints on 1916 telephone lines. The civic complaints are registered on computer, complaint number is conveyed to the complainant and sent to ward online. Complaints are attended by concerned Ward Offices. The complainant can also register the complaint on MCGM website viz. www.mcgm.gov.in.

Emergency Services: The 108 toll free help line service was operative in Municipal Corporation of Greater Mumbai from the year 2006. The emergency incidences like Earthquake, Bomb-blast, Landslide, House Collapse, Major accidents, etc. used to receive on this helpline. However, 108 number is now declared for “Emergency Medical Services” by Maharashtra Government from January 2014, both civic as well as emergency complaints are received on 1916 till the allotment of new number.

Emergency Support Function (ESF) : The Disaster Management Unit has introduced the Emergency Support Function (ESF) concept and is implemented in the emergency situations as well as in impending disasters. The ESFs provide the coordination mechanisms among the various agencies. They provide the organization and process to plan, manage and coordinate specific response and preparedness activities common to any hazardous event that can result in the emergency, from the most frequent one to the most extreme one. Each Emergency Support Function is headed by a lead agency and is supported by identified support agencies. These 'Emergency Support Functions' form an integral part of the Disaster Management Unit, each of which will coordinate its activities from the Municipal Corporation of Greater Mumbai Emergency Operations Centre.





Challenges Before Us

- 1) Day to day from megacity Mumbai to villages various problems generated due to solid waste are becoming terrible/terrific. The quantity of solid waste will be reduced, if separation of waste into dry/wet is done at source and fertilizer will be generated. Every citizen should take this responsibility.
- 2) We should not depend on government for everything but should discharge our responsibility taking into account the best example of tolerant nature and wild life. All wild lives are struggling to survive with changing climate.
- 3) Plastic bags less than 50 microns are thrown on the street carelessly consequently there is closing of sewer lines and storm water drainage arteries. Everybody must thought over it and cooperative to MCGM.
- 4) The nature provides us lot of things. Therefore it is our duty to keep nature flourishing and protect its conservation.
- 5) It is our social responsibility to take care for proper use of natural resources, tree plantation and maintenance, protection and conservation of wildlife and aquatic animals.
- 6) In future, if “Green Environment of Global” is managed properly challenge warming can be solved definitely.
- 7) In future, today's students are our strong and healthy citizens. It is necessary to develop culture in their school. Life for management of green environment. The public awareness is necessary for saving water, proper management and planning.
- 8) NGO's working on social levels for problems regarding environment and pollution or obeying laws passed on government levels and public awareness program. Participation of general public is very important.
- 9) For earth protection lot of things can be done on domestic levels such as preventing wastage of water and saving electricity.
- 10) Whole state from city to village is facing problems like solid waste, plastic bags, e-waste, cutting down trees, shortage of water, discharge of sewage water in nalla etc.
- 11) If dry and wet solid waste is segregated at source only 20% solid waste will be carried dumping ground. Then it is easy for MCGM to dispose off such solid waste properly.
- 12) Along with the development of cities, there is sheer negligence of nature which causes environmental problems. Even though laws are existing for controlling pollution protection of environment through law is becoming impossible. So it is necessary to change the mentality of every citizen.





SALIENT FEATURES OF MUMBAI'S ENVIRONMENT

- 1) Greater Mumbai is however severely constrained by its geography and occupies a small land area of 458.53 sq. km with a limited supply of land.
- 2) About 16336 no. of trees are planted on Municipal roads and open spaces.
- 3) Work of Tree Census (except mangroves and forest area) is undertaken in 2015-16. Work of tree census in 15 wards is completed. As per Tree Census Report there are 29,89,654 no. of trees in the city.
- 4) Even after commissioning of Middle Vaitarna Project, the gap between demand and supply for the year 2041 is 2840 MLD. To meet the gap and to increase the water supply to Mumbai it is proposed to undertake schemes to develop sources like Gargai and Pinjal
- 5) Mumbai receives an average of 2000 mm of rainfall. Considering 458.53 Sq.km. area of Mumbai the rain water falling in city works to approximately 2394 MLD. Even if 20% of this is saved and put to use at the rate 479 MLD of Municipal water can be saved.
- 6) The work of information regarding network of sewer lines in the form of printed records is nearly 90% completed by Geographic Information System.
- 7) In city area approximately 50.10 km. of road were concretised in 2015-16.
- 8) Under Mumbai Area Traffic Control Project, 255 signal junctions in Greater Mumbai have been upgraded.
- 9) In the academic year 2015-16, Education Department of MCGM runs 1083 Municipal primary schools in 8 different medium and 3,50,241 students are studying in these schools.
- 10) SAFAR-AIR (Mobile App) is a mobile app which can be downloaded free of cost. The app provides location specific current and forecasted air quality index and UV index. The app is user friendly and will benefit common man.
- 11) Helpline No. 022-24114000 is activated for prevention and control of H1N1 in Mumbai for public awareness.



