



REPORT OF
ECO HOUSING
PROJECT
IN PUNE CITY

Prepared For
United States-Asia Environmental Partnership

FRAMEWORK FOR ECO HOUSING PROJECT IN PUNE CITY

- DATA COLLECTION FROM PUNE MUNICIPAL CORPORATION.
- DATA COLLECTION FROM MAHARASHTRA STATE ELECTRICITY BOARD.
- PREPARATION OF QUESTIONNAIRE FOR INDIVIDUALS
- INTERACTION WITH STAKEHOLDERS IN HOUSING SECTOR
- CLASSIFICATION OF SEGMENTS OF HOUSING CATEGORY
- SETTING BENCH MARK
- STUDY OF ENVIRONMENTAL IMPACTS
- EXPLORING THE POSSIBILITIES TO PROMOTE IMPLEMENTATION BY TAX BENIFTS, INCENTIVES ETC.
- EXPLORING THE POSIBILITY OF DEVELOPMENT OF ENTREPRENUER FOR WASTE UTILISATION AND RECOVERY
- AWARENESS PROGRAM
- PREPRATION OF ACTION PLAN

Growth in population of Pune

Rise in population is due to migration.

Why people migrate to Pune?

- Strong civic infrastructure.
- Strong law and order.
- Better international connectivity.
- A deep rooted and sustained culture.
- Excellent educational facilities.
- Proper medical care with modern facilities.
- Conducive business environment.
- Comparatively slower pace of life.

Others reasons

- Defense activities
- Automobile Industries, Software Parks
- Center of Education.

POPULATION GROWTH



■ YEAR ■ POPULATION

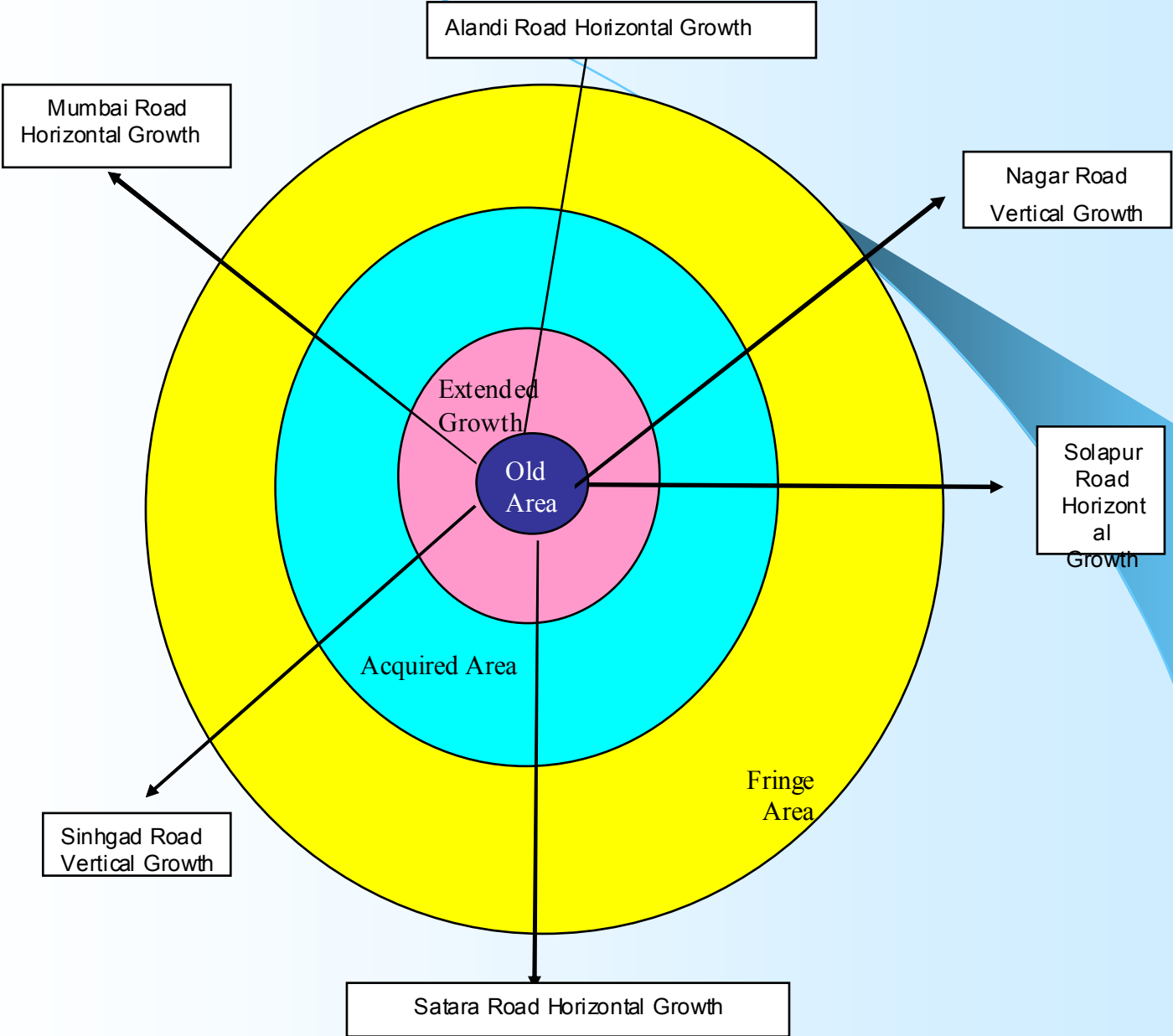
PROJECTED POPULATION

(FIGURES ARE IN THOUSANDS)

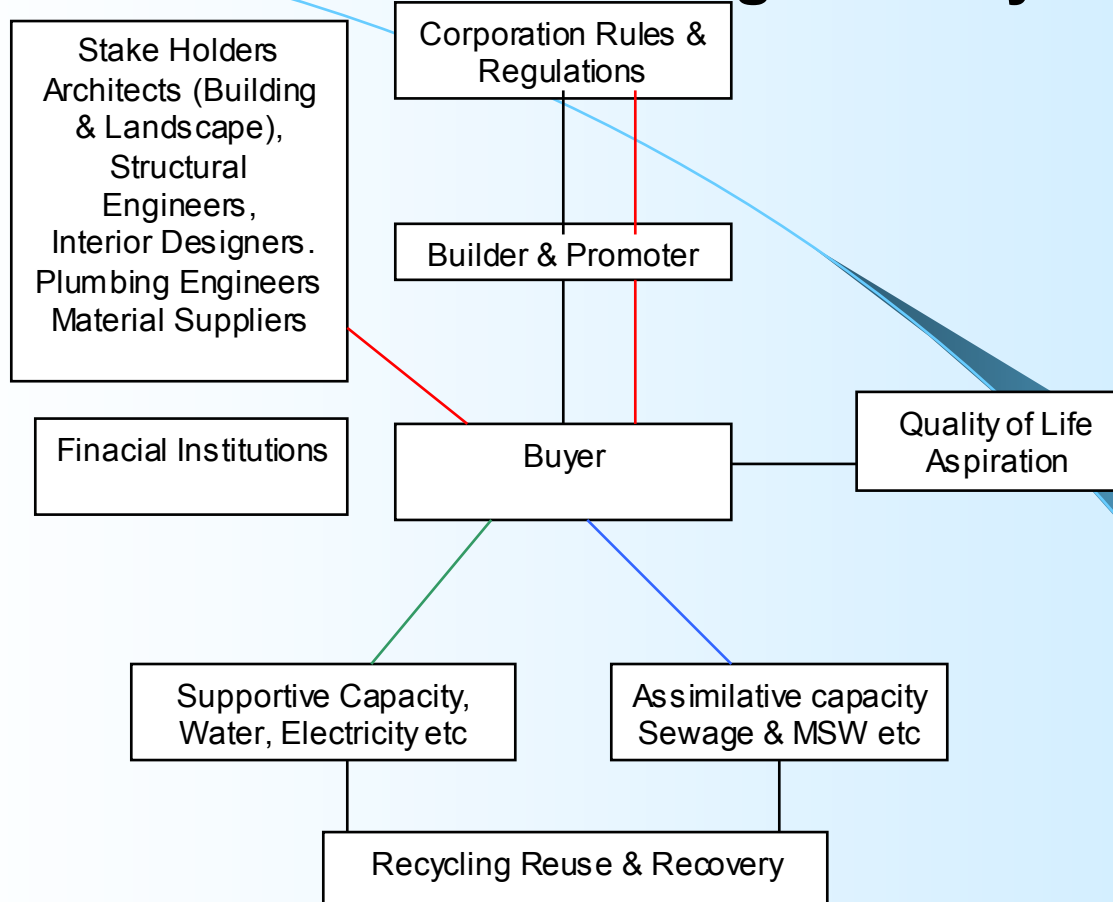


■ YEAR ■ POPULATION

Schematic Representation of Growth of Pune City



Present status of Housing Industry in Pune



Gap in resource supply and increase in demand result in rise in cost.

Rules & design are made without users feed back

Waste Treatment is either not done or inadequate thus overloading assimilative capacity

The Profile of Growth in Housing Sector

Growth Year

a. 1970 to 1980

b. 1980 to 1990

c. 1990 to 2000

d. 2000 onwards

Parameters of Profile

Local investment

Area of development

Cost of Construction

Customers choice

House Loan Facilities

Increase in allied construction business

Type of buyer

Stress on carrying capacity

Cost of maintenance of housing sector

Maintenance of Housing Sector- Major issues

- One time maintenance and falling interest (13% to 6%).
- The maintenance of luxurious facilities is difficult.
- Water is procured by tanker (Rs. 500 / tanker)
- Drinking water cost (as high as Rs. 2 / liter).
- The impact on amenities and resources is not considered.
- PMC cannot supply drinking water and provide sewerage line in new growth centers with macro development.
- The sustainability of mega townships is questionable.
- Power cost of common facilities (Lift, Pump etc.) is going up.
- The power cost of complex is not yet a deciding factor for the buyer.

DATA COLLECTION FROM PUNE MUNICIPAL CORPORATION & MHARASHTRA STATE ELECTRICITY BOARD

- Presentation of Eco-housing concept along with direct & indirect benefits for fast growing Pune to Commissioner of Municipal Corporation.
- Receipt of the consent from Commissioner & approval for collection of data from various departments.
- Preparation of questionnaire for collection of information from respective departments.
- Personal visit to the concerned officer to get verbal and written information
- Study of the existing status and proposed development of Pune city.

PARAMETERS FOR PREPARATION OF QUESTIONNAIRE FOR INDIVIDUALS

Parameters are derived by interaction with Stakeholders

- Economical status
- Social background
- Number of persons in family their gender and age
- Availability and quality of water source
- Personal amenities related to water usage
- Water consumption pattern for various activities
- Social and moral responsibility for reduction of resource consumption (Water and Energy) and waste generation.
- Awareness for reduction in resource consumption and waste generation.
- Conversion of waste into value added products.
- Efforts made for exploring the new resources like rain harvesting and solar energy.

CLASSIFICATION OF SEGMENTS OF HOUSING CATEGORY

- Old and new Pune
- Fringe area included in Pune Municipal Corporation
- Cost of the land and building
- Commercial, Industrial and Educational activities
- Standard of living
- Change in quality of life
- Social, Cultural and Religious background
- Income pattern

THE BENCH MARK ARE DECIDED FOR

- Water Consumption and usages pattern
- Sewage Generation, reuse and recycling
- Solid Waste Generation, segregation and Disposal
- Energy consumption and conservation

PARAMETERS FOR BENCH MARK

- Social behavior
- Religious and moral responsibility
- Economical status
- Aspiration to have more
- Availability of resources
- Awareness
- Supportive and assimilative capacity of Environment
- The marketing efforts to promote consumption of products
- Likely variation in above inputs and impacts on the bench marks

Methodology for Assigning Values to Bench Mark

Filling the Questionnaire



Interpretation of the findings



Investigating the deciding factors for value of Benchmarks



Calculation of consumption for different activities

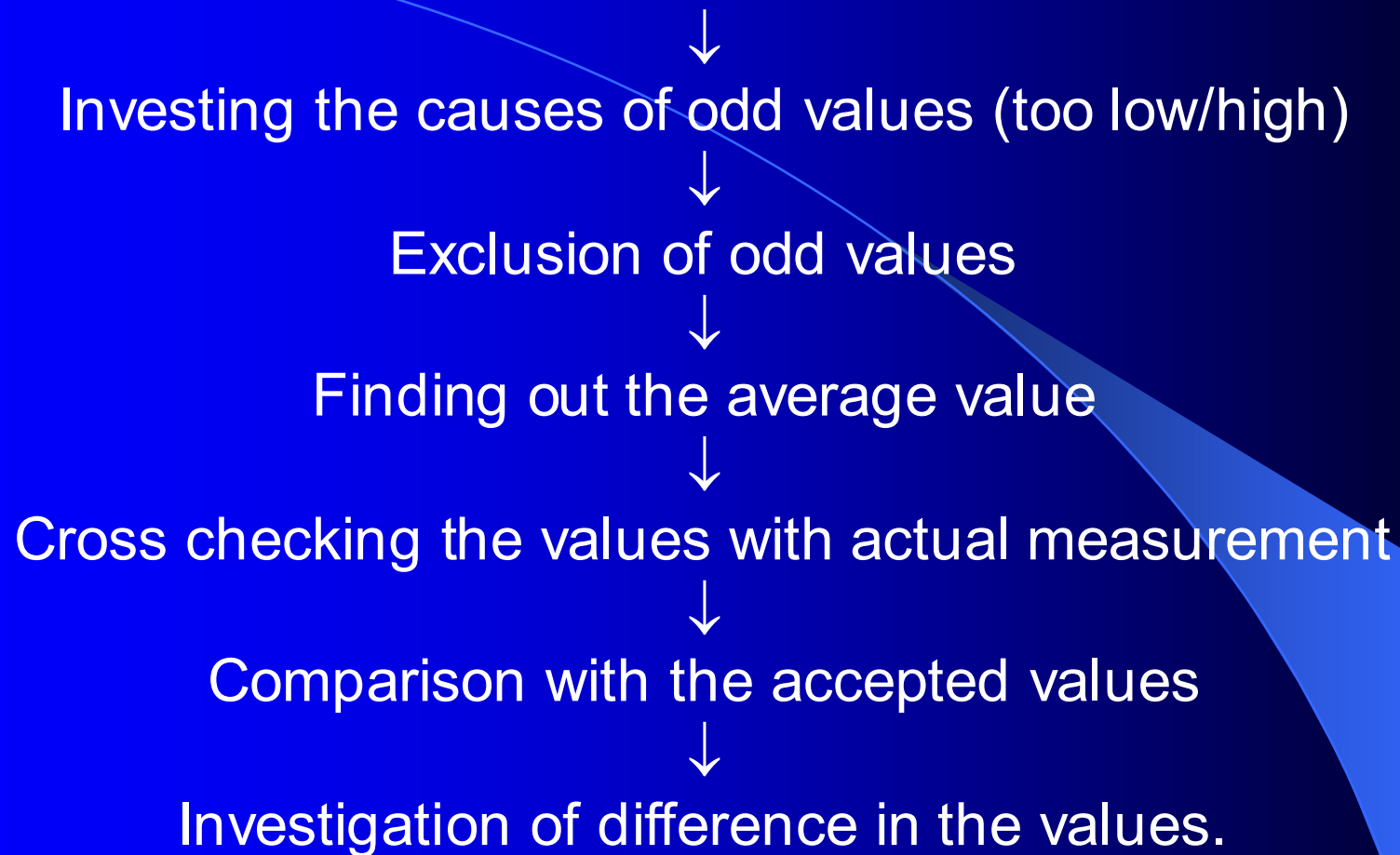


Summation of all consumptions in house



Finding out minimum and maximum values





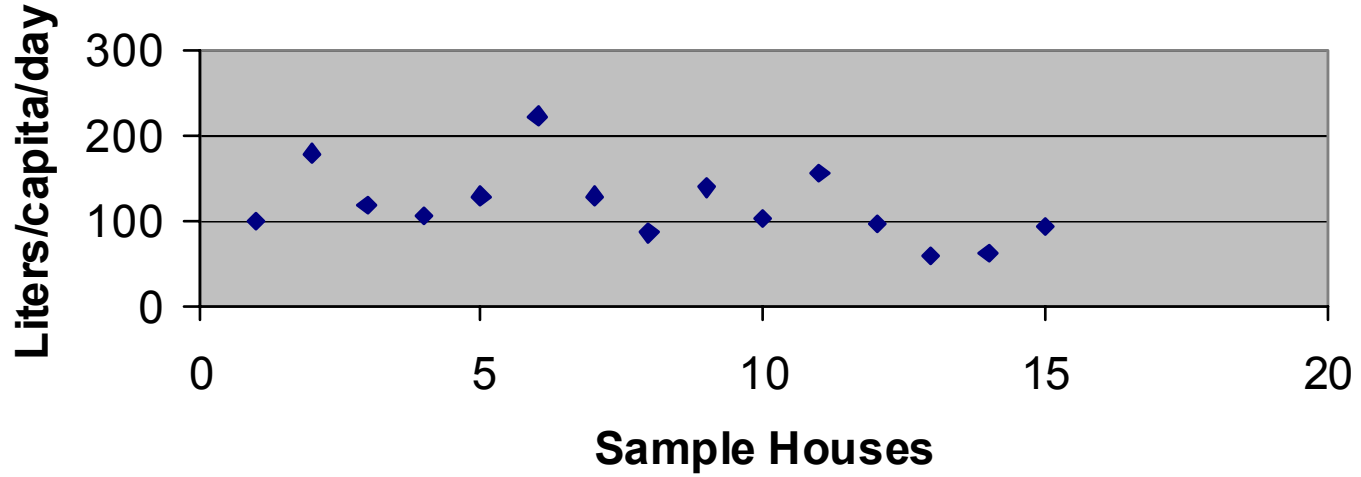
Key Factors for Consumption & Waste generation

Factors

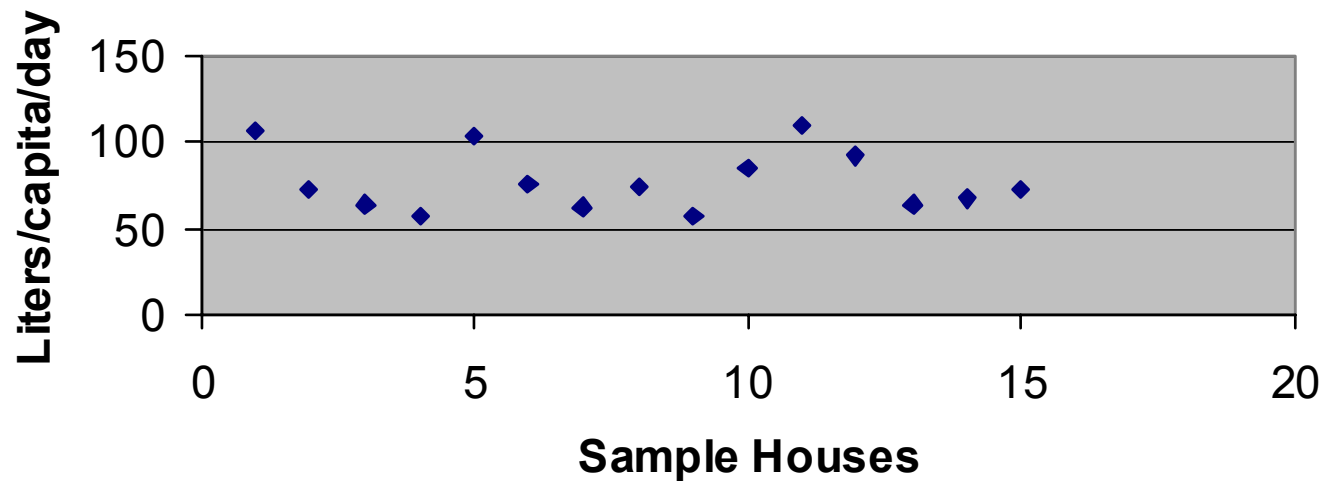
- Economical Status
- Quality of life
- Social background
- Habits & awareness
- Number of persons
- Number of ladies
- Availability
- Cost of water
- Types of home appliances
- Pressure in pipe line

Operations in water collections, storage and distribution	Methods			
	1	2	3	4
Collected and stored in ground service reservoir	✓	✓		✓
Pump to overhead tank or elevated service reservoir	✓	✓		
Distribution through pipe line for 24 hr	✓			
Distribution through pipe line for fixed hr		✓		
Directly collected in drums and stored for usage in house			✓	
Supplied by hydro-pneumatic system				✓

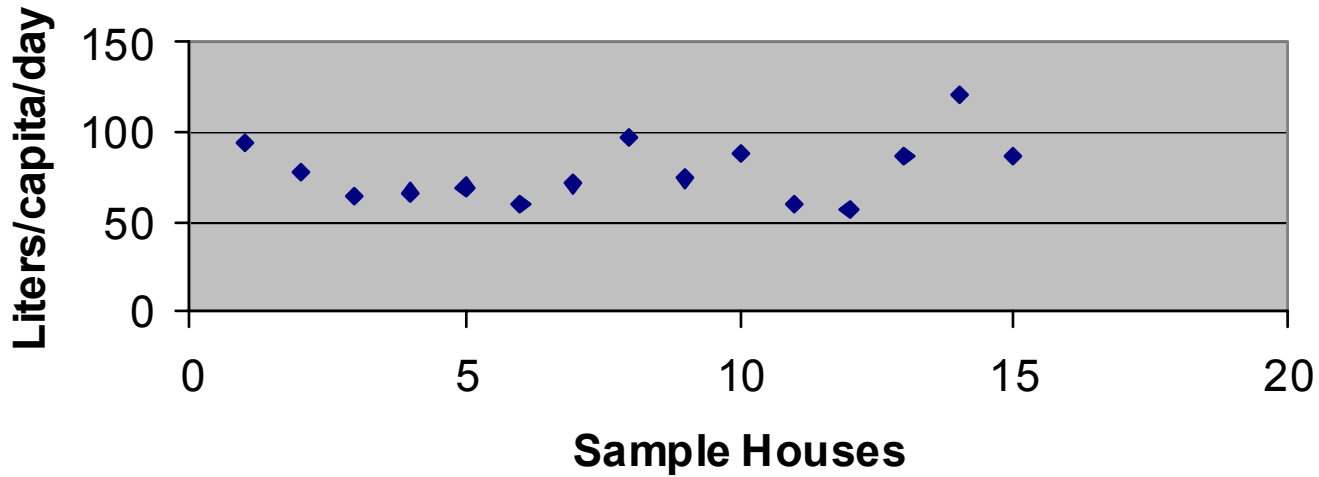
Water Consumption in UIG Sector



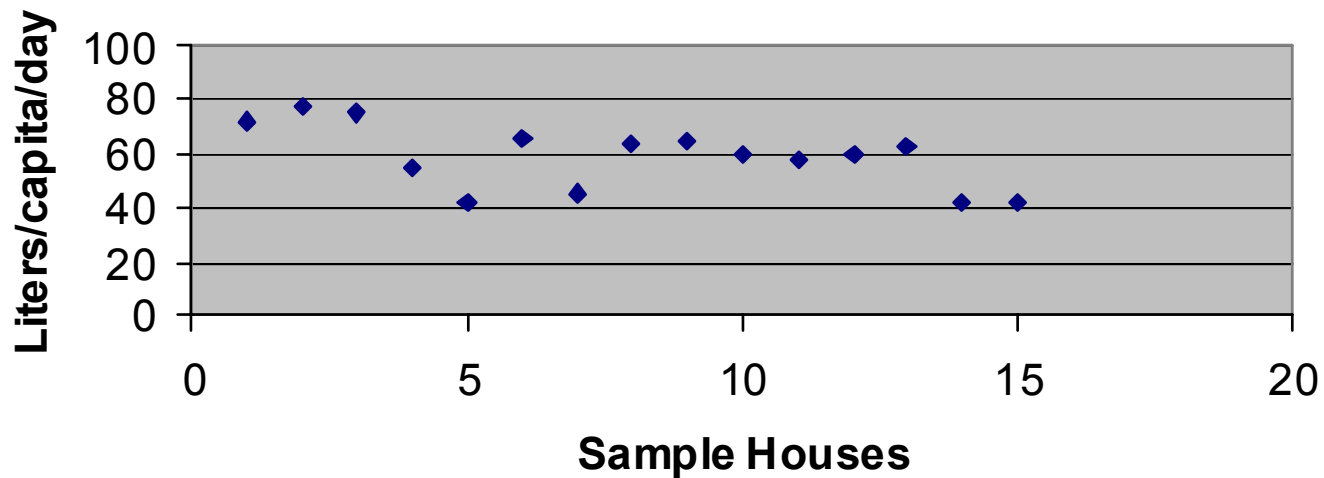
Water Consumption in MIG Sector



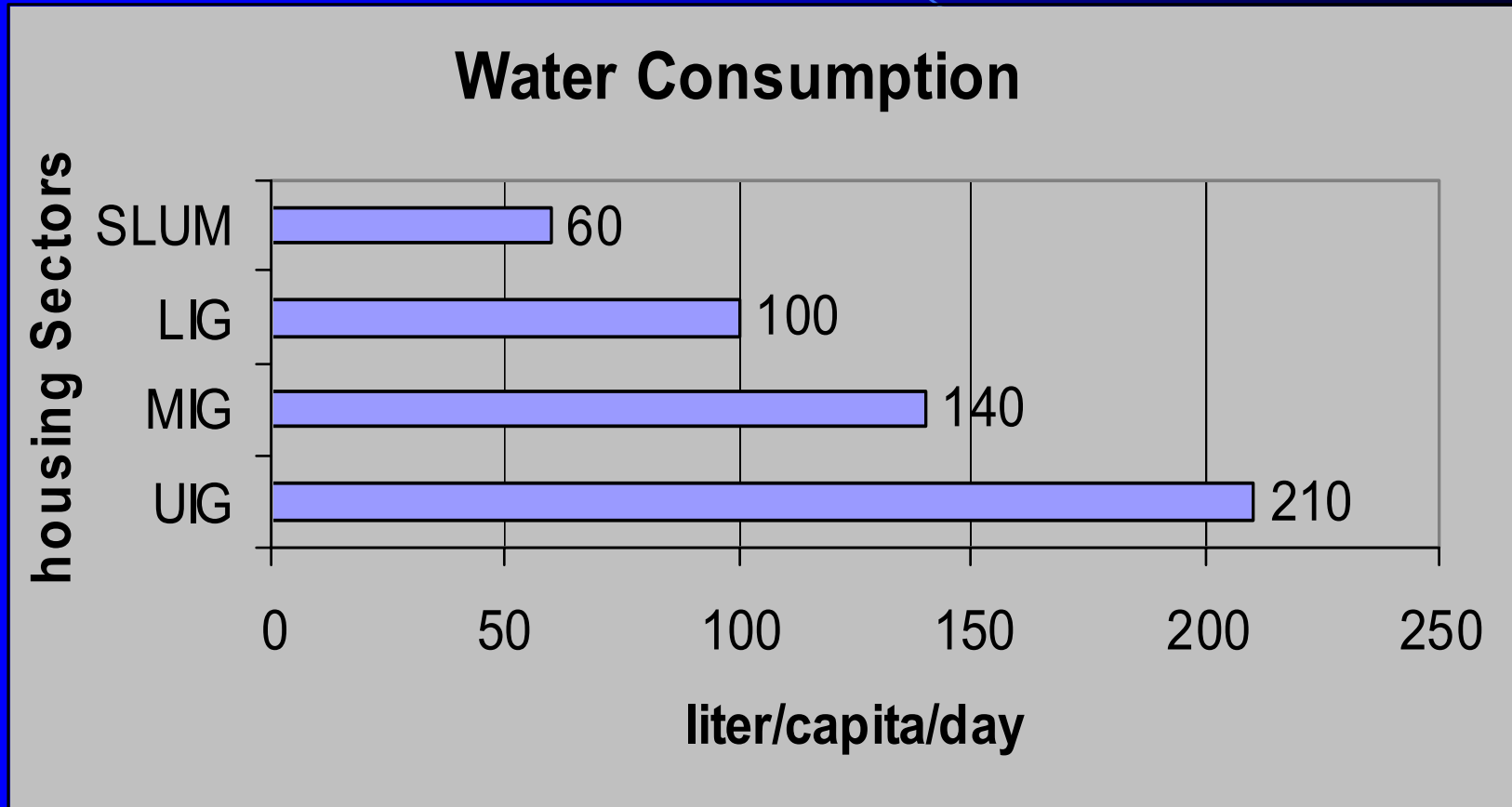
Water Consumption in LIG Sector



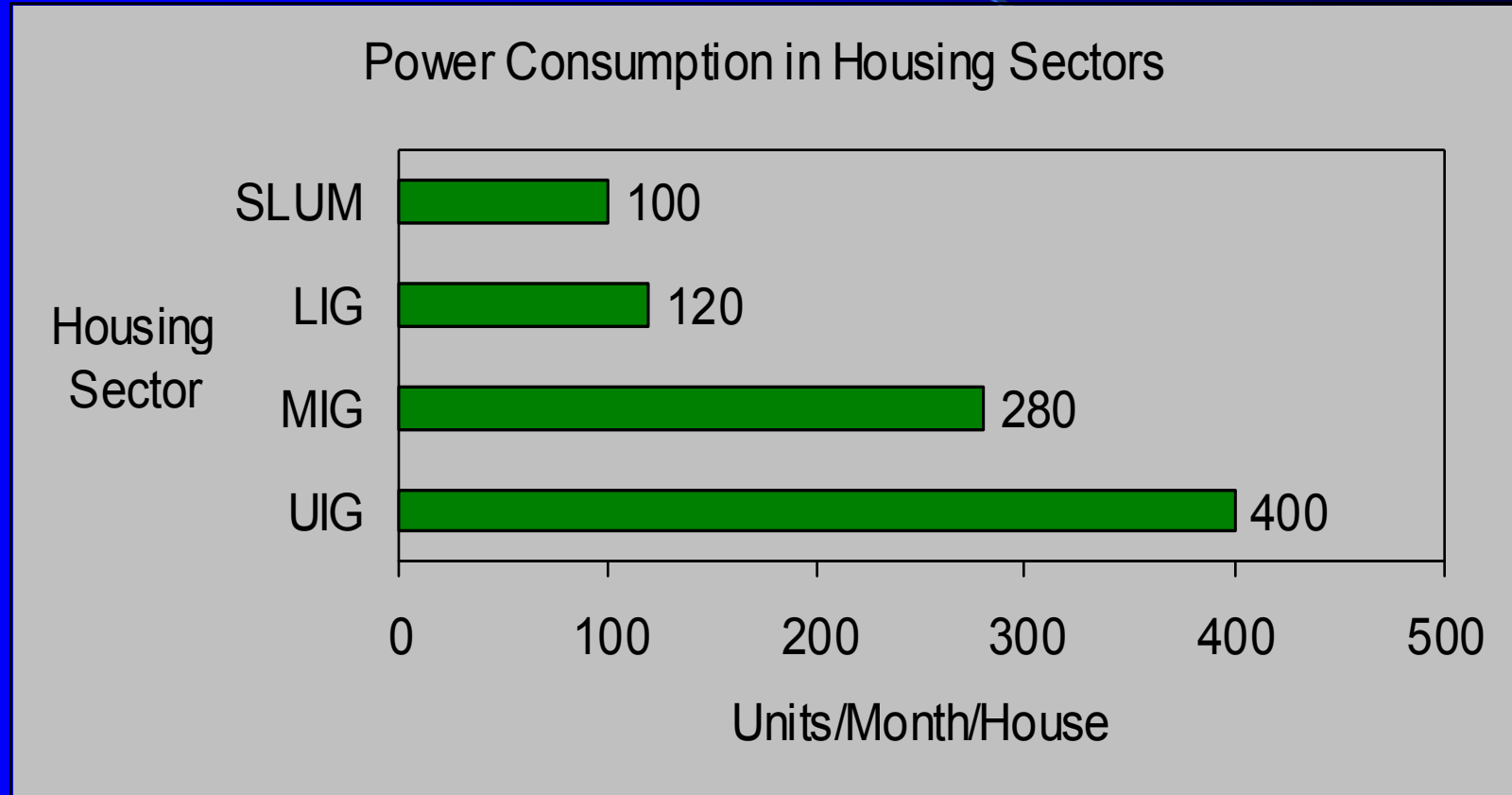
Water Consumption in SLUM Sector



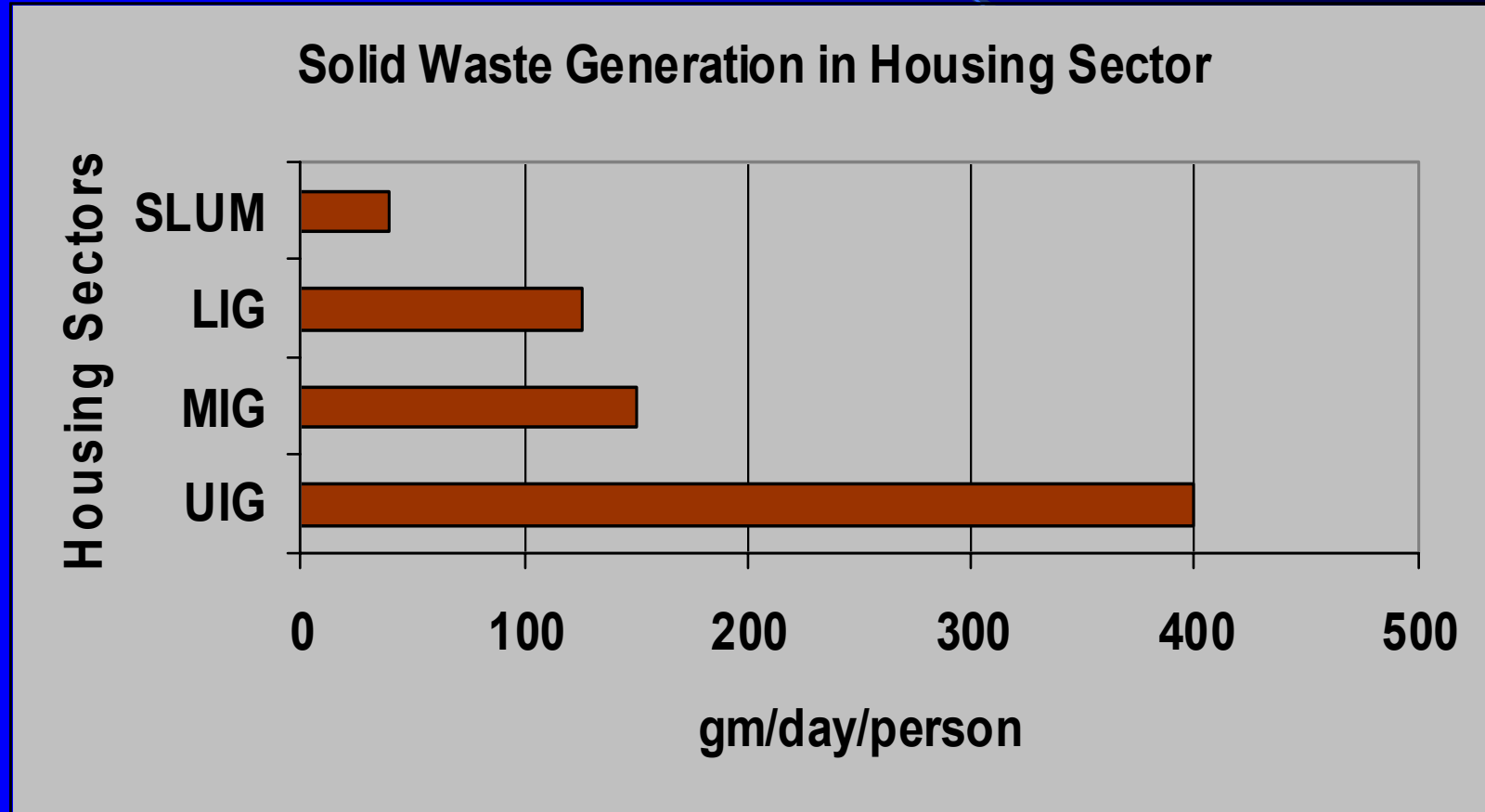
WATER CONSUMPTION



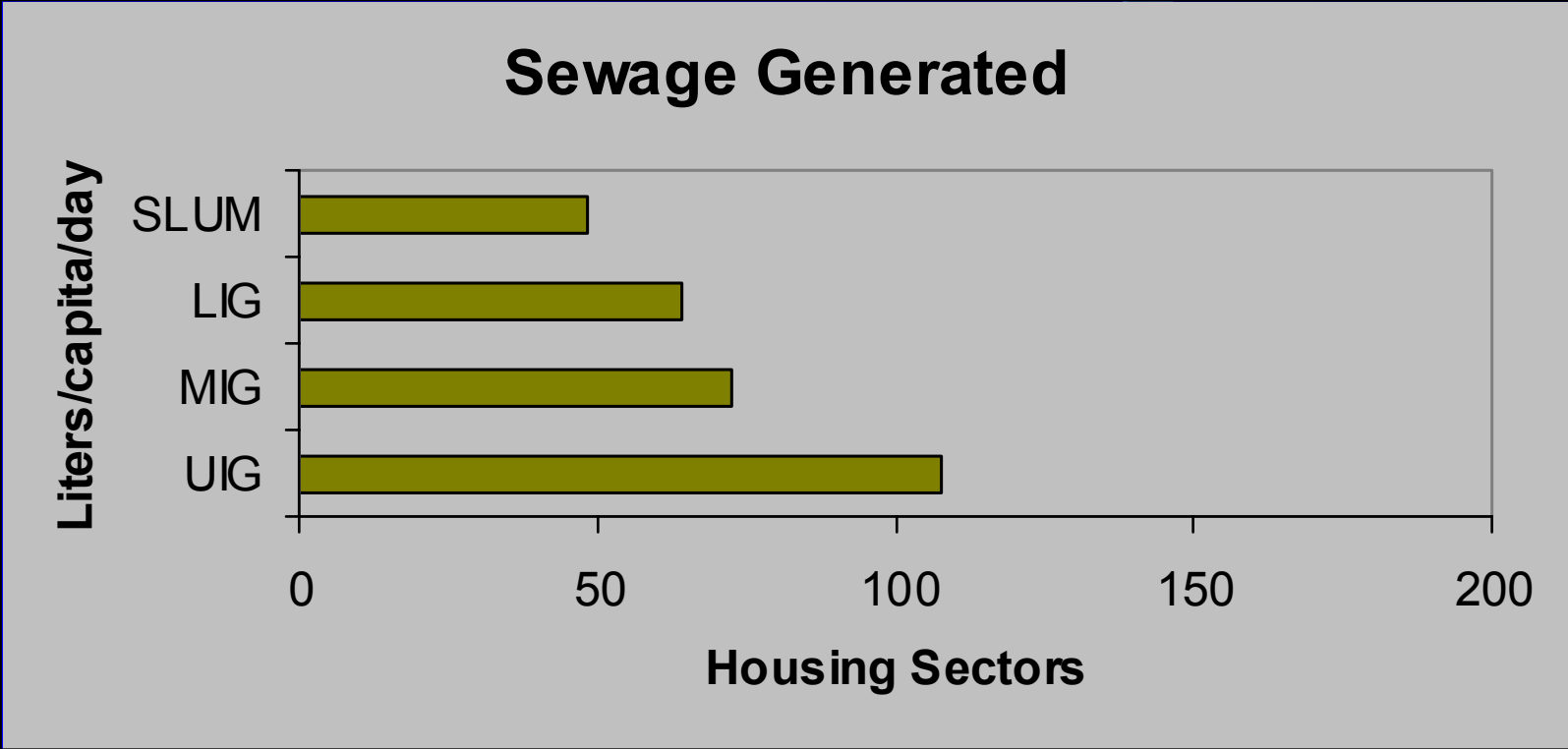
POWER CONSUMPTION



SOLID WASTE GENERATION



SEWAGE GENERATION



Operations in wastewater handling

- Waste water from WC and other activities go together.
- Segregation of sewage and sullage.
- All wastewater joins PMC sewer.
- Wastewater from WC goes to septic Tank.
- All wastewater goes to septic tank.
- Overflow of septic tank goes to soak pit.
- Overflow of septic tank joins PMC sewer.
- Other wastewater joins sewer line.
- Waste water from other activities is treated and reuse for WC flushing and gardening.
- Total waste water treated and disposed off to sewer line.
- Total waste water treated and reuse.
- Part of waste water overflows on open ground or joins open nullah.

Power Consumption

- Findings are very similar to water consumption.
- Depend on number electric home appliance.
- Use of Refrigerator & extensive use of Television increases power consumption even in LIG & MIG group.
- Daylight is not fully utilized in architecture.
- Home appliance like Television is common in LIG & slum.
- Additional facilities (Lift) increases power consumption.
- Energy efficiency of home appliances is not taken in consideration.
- Power supply in the slum is not from M.S.E.B. Parallel agency is running to supply power at fix rate (Rs. 100 to 200 for one or two points). This has resulted in the limited use of power.

Type of Solid Waste Generation

Daily	Weekly	Monthly	Occasional
Milk bags	Bottles	Tooth paste tube	Footwear
News Paper	Plastic bag	Washing powder bag	Glassware
Plastic bag	Corrugated Boxes	Magazines	Broken utensils
Vegetable waste	Soap packing		Broken bottles
Left over food	Shampoo packing		Clothes
Dust	Medicine stripes		
Paper Plastic Packing			
Plastic packing			

Operations in solid waste handling

- All solid waste collected together
- Biodegradable and non-biodegradable waste are segregated
- Dump to PMC dust bin
- Throw anywhere
- Handed over to rag picker
- Biodegradable goes to composting/other use
- Handover to garbage collector
- Nothing is thrown out

Awareness in Solid Waste Handling

- Non-biodegradable wastes are segregated from the total solid waste in each House.
- Non-biodegradable wastes is either purchased by rag pickers or handed over to the maidservant.
- Generation of biodegradable waste in Slum, LIG & MIG is very less due to following reasons.
- *The whole food utilization is implemented.*
- *Food is considered as very valuable & respectable.*
- *commodity and nothing is thrown.*
- *Left over food is given to maidservant.*
- *Limited food is cooked and not allowed to get waste.*
- Due to the life style the generation of biodegradable & non-biodegradable waste in UIG is high.

Better practices of for water usage

Re-planning of water related activities to saves water. A few examples are given below.

- Use of water in bucket or mug instead washing under flowing water from tap.
- Reduction of flow through pipe by throttling the valve or reduction in pipe diameter.
- Proper selection of pipefitting and accessories.
- Using of water efficient home appliances.
- Reuse of water at personal level. For example use of wash water for watering the plant.
- Training of house wives and the maidservant for minimum use of water and energy during use of home appliances.
- We strongly recommend organizing a workshop of the consumer to develop the alternatives for personal efforts.

Reuse & Recycling

Collection of Sewage(From bathrooms & kitchen)

Screen chamber

Aerobic Biological Treatment(Rotating Biological Contactor)

Settling Tank

Gravity Filtration

Storage

Reuse

(Flushing toilets, car washing & gardening, recharge)

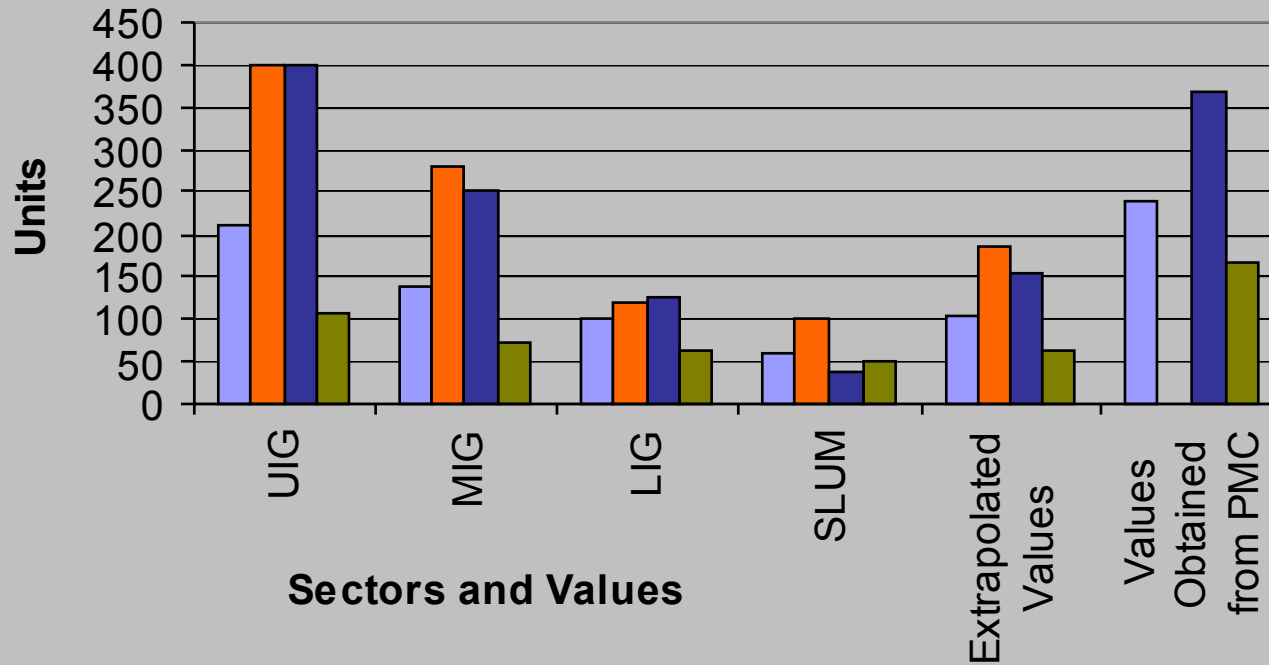
What to do?

- Integration of producer and consumer for water and energy efficient home appliances.
- Mass advertising for energy savings.
- Awareness Programs for stakeholders.
- Rainwater harvesting.
- Development of existing network for rag pickers.
- Users friendly systems for reprocess of biodegradable waste (fodder, use of coconut shell, simple composting).
- Joint efforts PMC, MSEB & NGO's & all stakeholders.

Methodology for Extrapolation of Data

- Assigning values to benchmarks.
- Sample survey of areas in old and extended Pune.
- Finding out percentage of UIG, MIG, LIG & SLUM population in surveyed area.
- Averaging values to decide percentage.
- Total population of Pune is assumed as 2696999 as per census of year 2001.
- Finding out the total population in each sector of Pune.
- Calculation of consumption or generation by multiplying calculated population by assigned benchmark value in respective sectors.
- Summation of all values to know the total consumption.
- Dividing the total of above by total population to find out the average value.
- Comparison of actual value given by concerned authority with extrapolated data.

Graphical Representation of Comparison of Values



- Water Consumption (LPCD)
- Energy Consumption (units/capita/month)
- Solid Waste Generation (gm/capita/day)
- Sewage Generation (LPCD)

Conclusion of bench studies.

Benchmark values show wide variations in housing sectors. Besides values differ from assumed values by the concerned authorities (e.g. Pune Municipal Corporation) the values are lower than the values generally considered. Therefore there is a scope to have reduction in consumption of resources and reduction in waste generation.

Existing Network

Model for sustainable development

Results for analysis of data

Scope of Action Plan

Sr. No.	Action Plan	Stakeholders	Scope
1	Policy guidelines.	<ul style="list-style-type: none"> Pune Municipal Corporation Maharashtra State Electricity Board. Urban Town Planning Dept. 	<ul style="list-style-type: none"> Guidelines for all the levels of stakeholders for planning and execution of the action plan. Incentives and benefits to be given for implementation of action plan
2	Implementation program	<ul style="list-style-type: none"> Designers (architects, civil engineers, landscape architects, interior decorators etc.) House Builders 	<ul style="list-style-type: none"> Technical and commercial back up for implementation of action plan
3	Work guidelines	<ul style="list-style-type: none"> Promoters and Individual House Owner Developers Chairman and Secretary of Housing Societies. 	<ul style="list-style-type: none"> List of simple measures to be taken by stakeholders to reduce resource consumption and waste generation.

Guidelines for Policy makers

- Accessing the carrying capacity
- Short-term and long-term program for up gradation of carrying capacity.
- Formation of high level committee for reeducation of losses
- Modification in building code for water energy and waste.
- Guideline for reuse and recycling.
- Benchmark for water and energy consumption for home appliances.
- Compulsion of use of natural recourses.
- Code of conduct for water conservation.
- Water tax on actual consumption.
- Recycle of treated sewage by corporation.
- Rewards and incentives, fine & punishment.

Guidelines for Stakeholders (Builders, Architects etc.)

- Implementation of action plan.
- Acquiring technical backup.
- Eco-housing concept.
- Inclusion of additional cost in the price of flat.
- Use of natural elements.
- Interacting with manufactures for alternate products.
- Common platform.
- Understanding the sustainable development.

Guidelines for Individuals

- Reduction in water consumption by simple practices.
- Reduction, reuse & recycle waste.
- Reduction in power consumption.

Awareness Program

- Policy makers.
(Guidelines, Cost benefit analysis, Regional impact, Tools for implementation).
- Stakeholders
(Seminars, Workshops, Successful case studies & Visits).
- General
(Mass Media, Workshop, Participation of NGO's)

Classification of Wastewater

Sr. No.	Activity	Classification & Contamination	Alternate method
1	WC flush water	Strong Fecal organic matter	Separate line for collection & treatment in septic tank. Overflow of septic tank either can go to soak pit or to sewage treatment plant
2	Bathroom	Dilute Soap, shampoo, detergents, dust & dirt etc	Separate line for collection To treatment plant for recycling
3	Kitchen Cooking & washing	Mild, Vegetable & animal origin food products	To a common line for bathroom To treatment plant for recycling
4	Washbasin	Dilute Soap, dust & dirt.	To a common line for bathroom To treatment plant for recycling
5	Backwash water from Water Treatment Plant	Very dilute	Separate line either to treatment plant after biological treatment or collect and directly use for irrigation.

**ACTUAL
SITE
PHOTOGRAPH
AT
MON VERT 2
PUNE
RECYCLING
OF
WASTE WATER**



Thank you !!!