



Scientific Research vs. Practical Application



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Drinking Water & Surface Water Problems

- Microbial contamination;
- Chemical contamination (Arsenic, Iron, Ammonia and Nitrate);
- Urban rivers converting to Open Sewer;
- Frequent outbreaks of water borne diseases;
- Chronic shortage of Water in cities.



Waterborne diseases dog valley denizens

Himalayan News Service
Kathmandu, July 12

The valley has been facing several outbreaks of waterborne diseases, including acute gastroenteritis, since April.

According to the Epidemiology and Diseases Control Division (EDCD), over 3,339 cases of gastroenteritis were reported in the valley from April 15 to July 10.

Out of the patients, 185 were confirmed as having cholera and five deaths were reported. The record is based on the number of patients in the Kanti Children Hospital, Patan Hos-

pital, Bhaktapur Hospital, Nepal Medical College and Sukraraj Tropical and Infectious Disease Hospital.

Gastroenteritis is an illness with symptoms of abdominal pain and cramps, fever, vomiting, diarrhoea and loss of appetite that is chiefly caused by contaminated water.

A survey on water quality of the valley, conducted by the Central Laboratory, Kirtipur, showed that water quality is deteriorating in the valley since April this year. In April-May, 28 per cent of water in the valley was found undrinkable, in May-June 39 per cent of water was found unsafe for drinking and the percent-

Response to Microbial Contamination

- PIYUSH is a 0.5% chlorine solution produced by ENPHO in 1991/92 to combat epidemic of water borne diseases;
- Started to market after several researches such as stability and field testing;
- Currently recognised as one of the best options for household water treatment option in Nepal.



Behind the Scene

- Took nearly 10 years for its official recognition;
- No authority for its registration – duplicate PIYUSH;
- Produced by scientific research NGO – limited marketing skills;
- UN-agencies like UNICEF and WHO started to promote need of household water treatment (HWT) from early 2000;
- International brand “WaterGuard” started its market in 2005 with technical support from ENPHO;
- Government launched National HWT Programme in 2005;
- Finally PIYUSH has been recognised.....

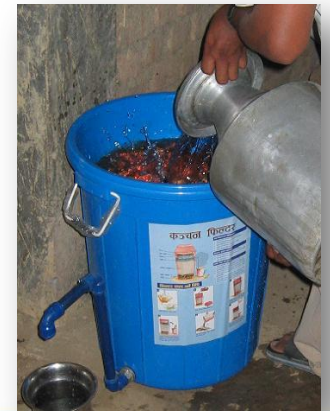
Response to Arsenic Problem

- Arsenic contamination was known in Nepal 1999;
- ENPHO and MIT, USA joins hand for research and development in arsenic related issues during 2000;
- One of the outcome of this collaboration was development of household level arsenic removal filter called **Kanchan Arsenic Filter** in 2003;
- More than 10,000 families are using this filter in Nepal.



Behind the Scene

- Systematic Research by National and International students;
- Involvement of MIT with regular technical backstopping;
- Research papers and publications;
- International and National Award and Recognition;
- Follow up research and regular monitoring & evaluation;
- Can be assembled with locally available materials;
- Capacity building of local entrepreneurs;
- Government recognition.



Response to Wastewater Management Problem

- Introduced Constructed Wetland in 1997 during PhD research;
- Proved to be an effective technology for treatment of wastewater and grey water recycling;
- Scaling up at municipality for treatment of municipal wastewater;
- Challenges remain in its sustainable operation



Behind the Scene

- Continued researches by Master & PhD researchers;
- Adequate scientific researches but limited professionals for practical applications;
- Consultants and contractors are not well trained;
- Slow scaling up as wastewater treatment is still not a priority;
- Government and donors procurement modality not appropriate;
- Ignorance in O&M;

Fecal Sludge and Land fill Leachate Treatment System in Pokhara Municipality

- Large CW system – built with several conflicts;
- Concentrate more on construction rather than technical issues;
- Operate without having proper training and O&M guideline



Case Study on Community Managed System

- Took nearly 2 to 3 years to build a small unit;
- Socio-political factor, poor governance, lack of elected representative;
- No encouragement and least priority at all levels;
- Negative attitude towards WWT system.



Scaling up and Risk in operation

- More than 20 units are under construction in 8 municipalities;
- Most of the units are designed by consultants having limited knowledge on practical aspects;
- Limited capacity on of municipalities to operate and maintain the system;
- No community participation ownership.



Eco-Home

Rainwater
catchment

Rainwater
catchment

**Home Without City Water Supply
Reuse & Recycle of Waste**

Built in 2002 occupies 135 m² Area

Roof
tanks

UDD
toilet

Solar
panel

Dug well for
Ground water
recharge

Garden

Greywater
Treatment
Plant



Biosand filter
for water
treatment

Water collection
Tank

ECO-HOME

An approach to sustainable water management

Use water wisely based on Human Values



Urine & faeces separating Comod-saving water to flush



Urine & faeces collection tanks at the basement



Urine as fertilizer



Area of house & space: 135 sq.m. (4 anna 1 paisa)
Family size: 4 members



Catchment area for rainwater harvesting



Ground water recharge through dugwell



Rainwater first flush tank to washout dirt

Salient features of ECO HOME

- ZERO Waste House (no discharge of waste water and solid waste)
- Everything recycles including urine and faeces with natural sanitation
- Very low water consumption (approx. 4700 litres per month)
- Rainwater harvesting potential of 115,000 litres per year
- No municipal water supply in the house but it gets sufficient rainwater supply for 7 months (April/May to Oct/Nov) & gets water from the recharged dugwell for the remaining 5 months (Nov/Dec. to March/April)

Total Water Demand and Consumption

Purpose	Ltr/ Day	Ltr/ Month
Drinking & cooking	20	600
Dishwashing, bathing & laundry	155	4550
Toilet flushing, cleaning vehicle & gardening	120	3600
Total water demand	295	8650
Treated greywater for re-use	136.6	4185
Clean water requirement	158.5	4965



Compost out of faeces



Grey water treatment system (Constructed Wetland) Area: 5 Sq.m.



Solar water heater



Compost Bin for kitchen waste management



500Ls for drinking water treatment



Bio Sand Filter to treat dugwell water



Terrace garden maintained with the application of urine & faeces compost



Vegetables, Fruits and Flowers flourished with the application of urine & faeces compost



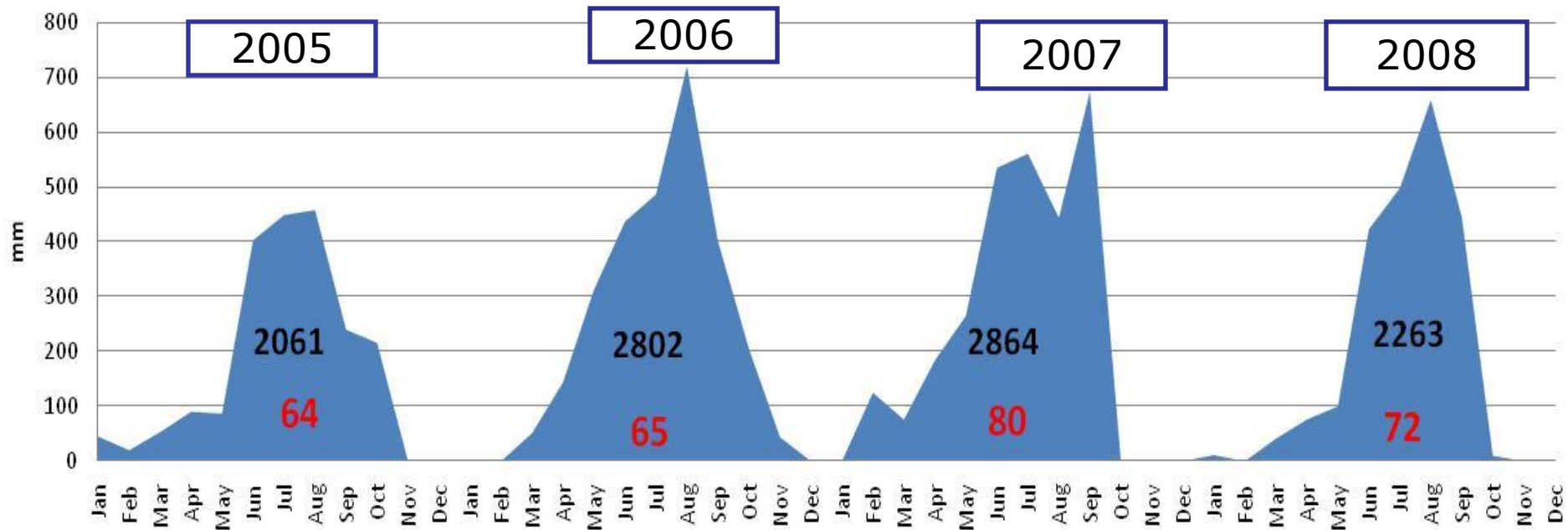
A two year boy watering the plants a right time to begin Value Based Water Education

NGO Forum for
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Rainfall in Kathmandu (mm) : 2005 to 2008



Month	Average Monthly Precipitation Rate (mm)	Annual Precipitation Rate (m)	Area of KTM Valley m2	Kathmandu Valley RWH potential (m3)	MLD	Area of KTM city (m2)	Rainwater Harvesting potential of Kathmand City in liters	MLD
2005	2061	2.061	640000000	1055232000000	2891	50760000	83693088000	229
2006	2802	2.802	640000000	1434624000000	3930	50760000	113783616000	312
2007	2864	2.864	640000000	1466368000000	4017	50760000	116301312000	319
2008	2263	2.263	640000000	1158656000000	3174	50760000	91895904000	252



Key Lesson Learnt

- Research can be operationalised – need patient and better strategy;
- Applied researches (need based) are more important for developing nations;
- Team work is the must;
- Need networking and partnership with national and international institutions;
- Advocacy through publication and dissemination;
- Build local capacity;
- Government Recognition.

Way Forward

