



Optimisation of Water Use at Home

seecon international gmbh

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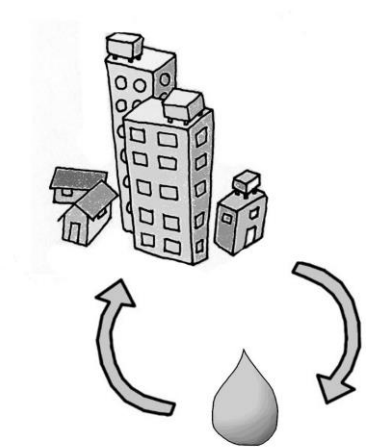
Depending on the initial situations and respective local circumstances, there is no guarantee that single measures described in the toolbox will make the local water and sanitation system more sustainable. The main aim of the SSWM Toolbox is to be a reference tool to provide ideas for improving the local water and sanitation situation in a sustainable manner. Results depend largely on the respective situation and the implementation and combination of the measures described. An in-depth analysis of respective advantages and disadvantages and the suitability of the measure is necessary in every single case. We do not assume any responsibility for and make no warranty with respect to the results that may be obtained from the use of the information provided.



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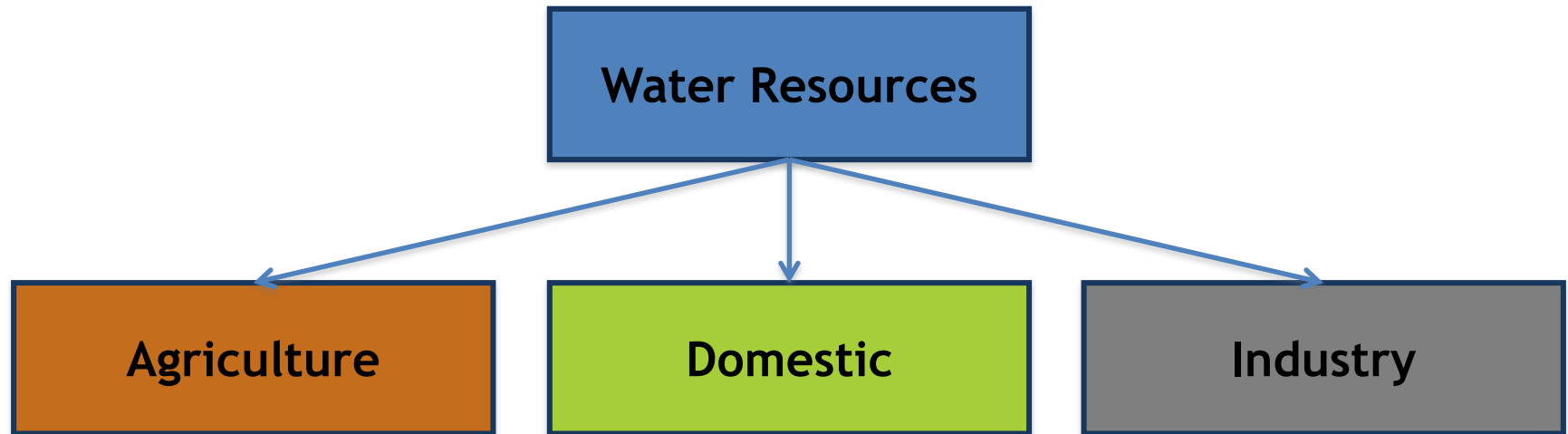
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A: Annex 1: Case Study - The SSWM Eco-House



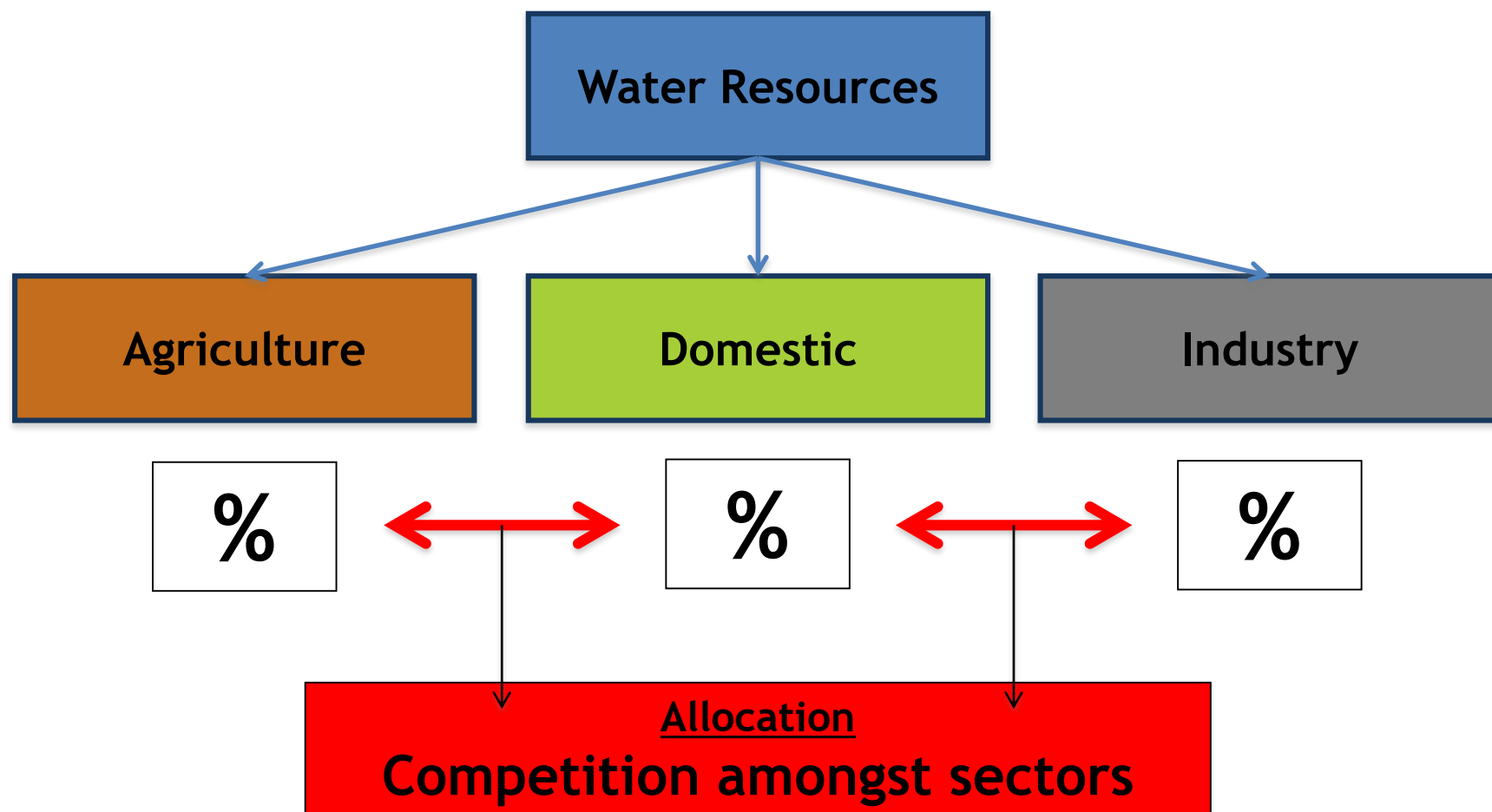
1. Introduction

Water Allocation with Declining Water Resources



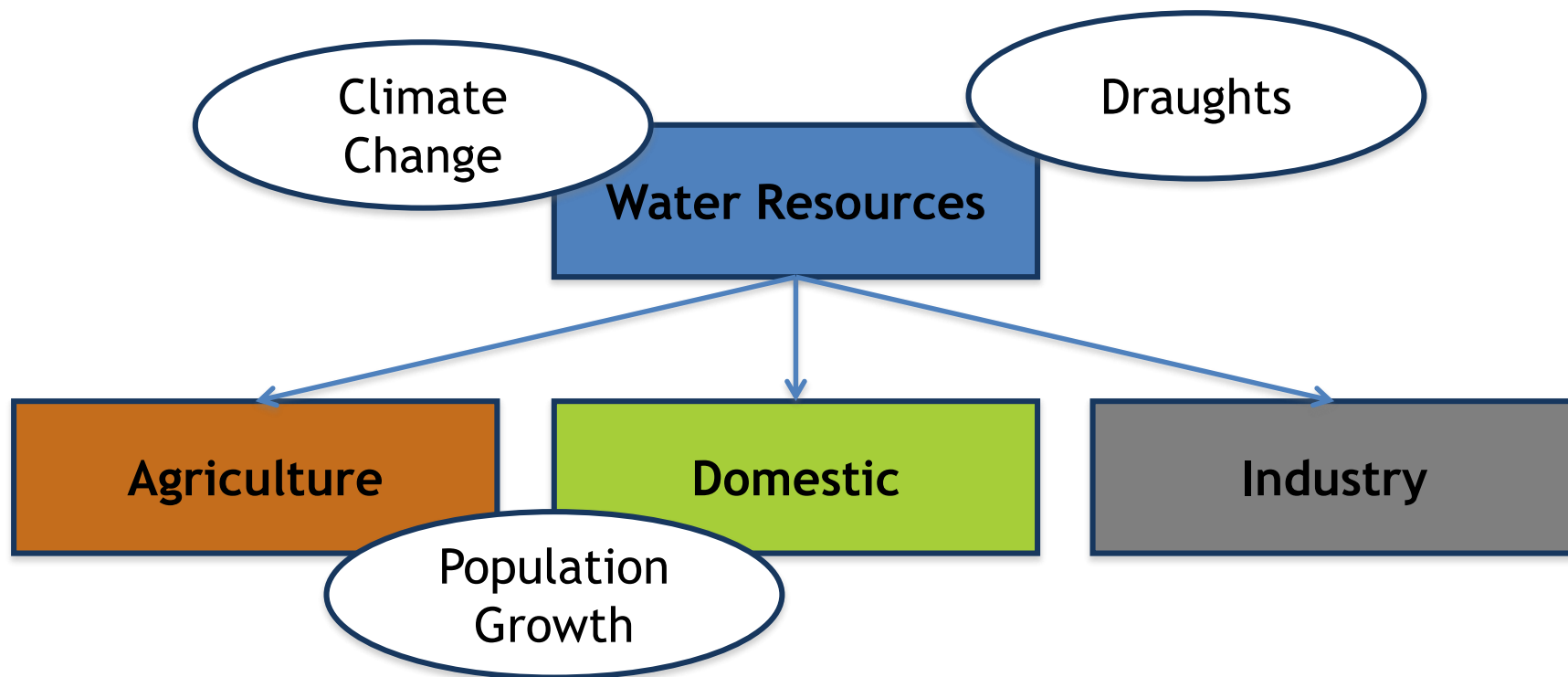
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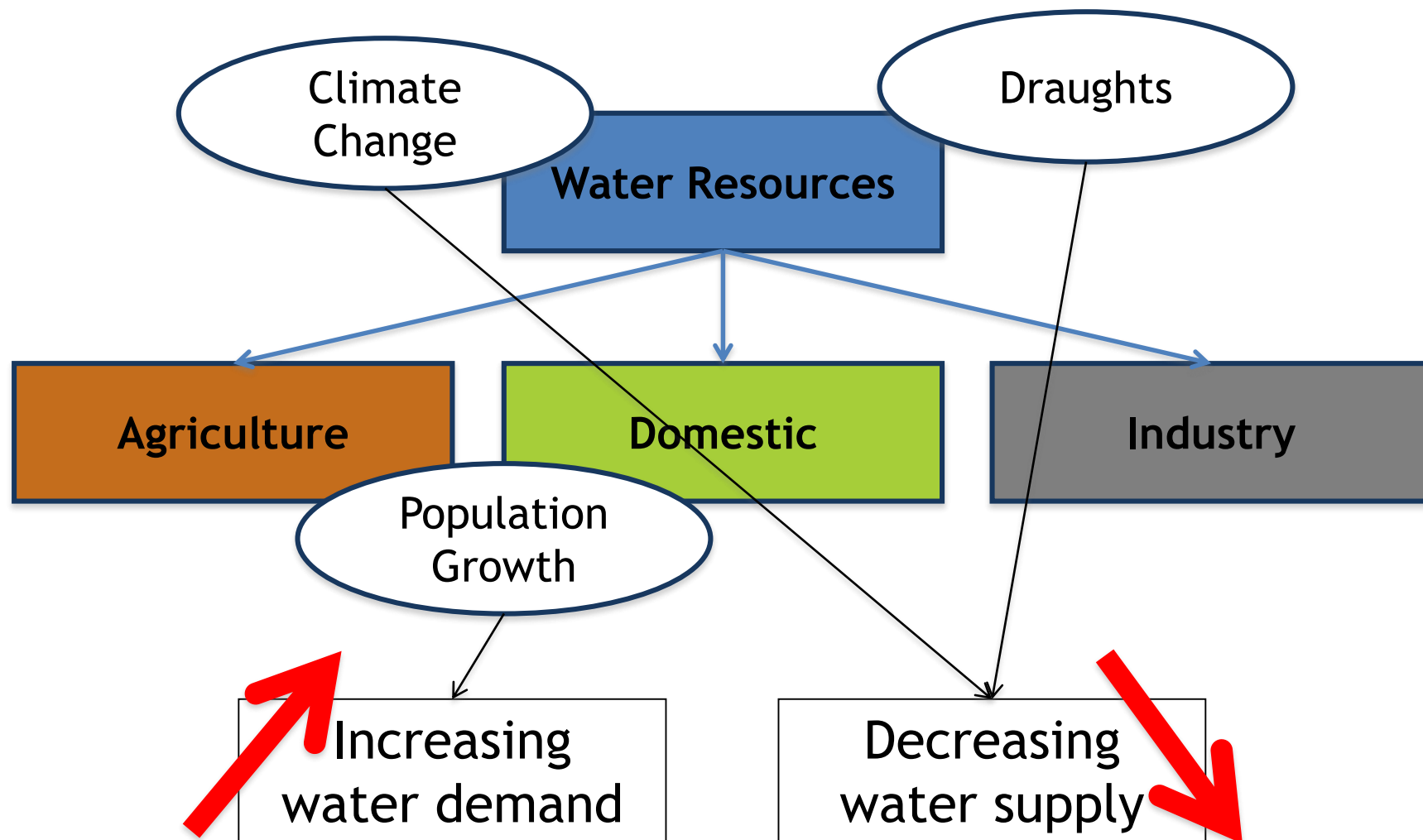
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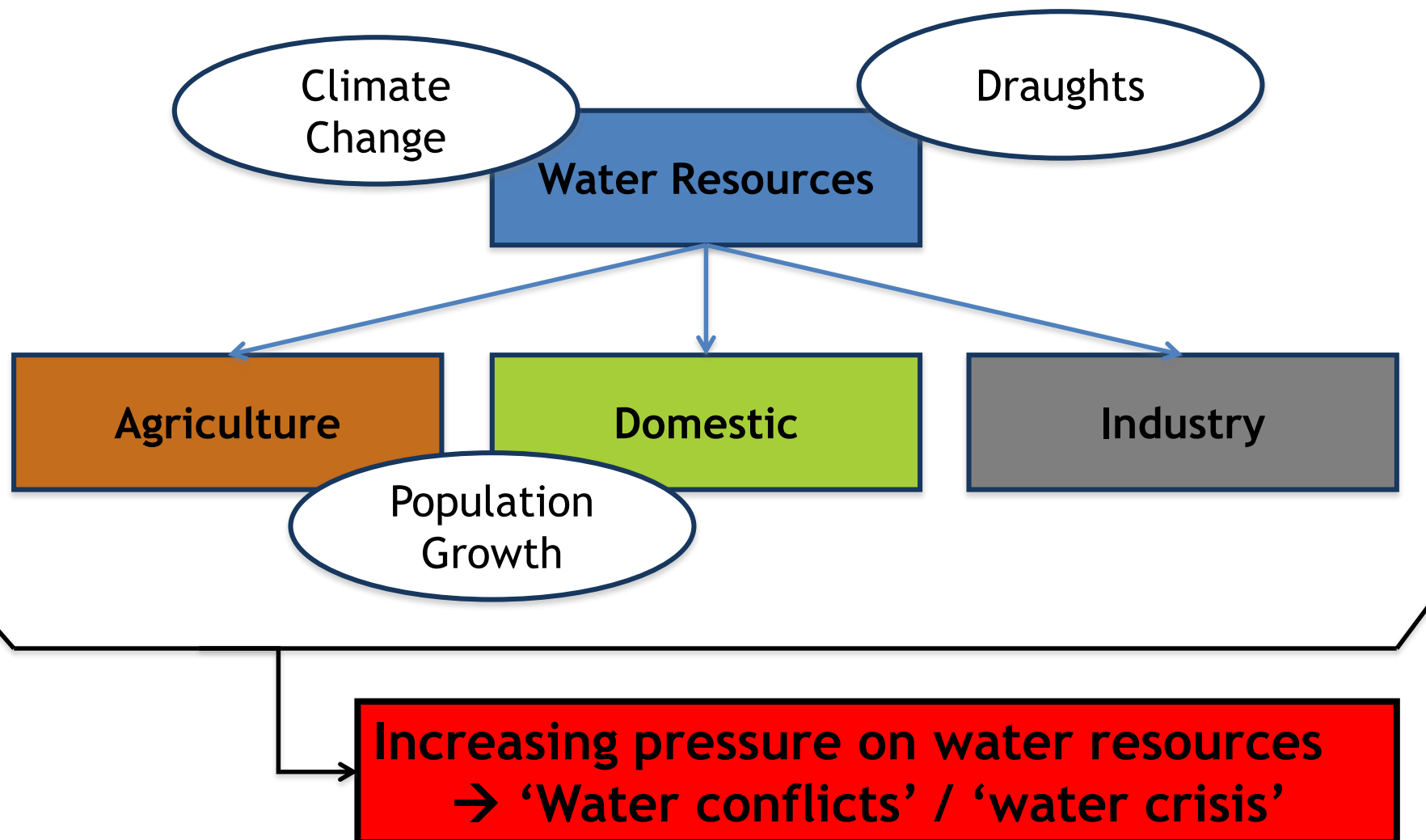
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Water Allocation with Declining Water Resources



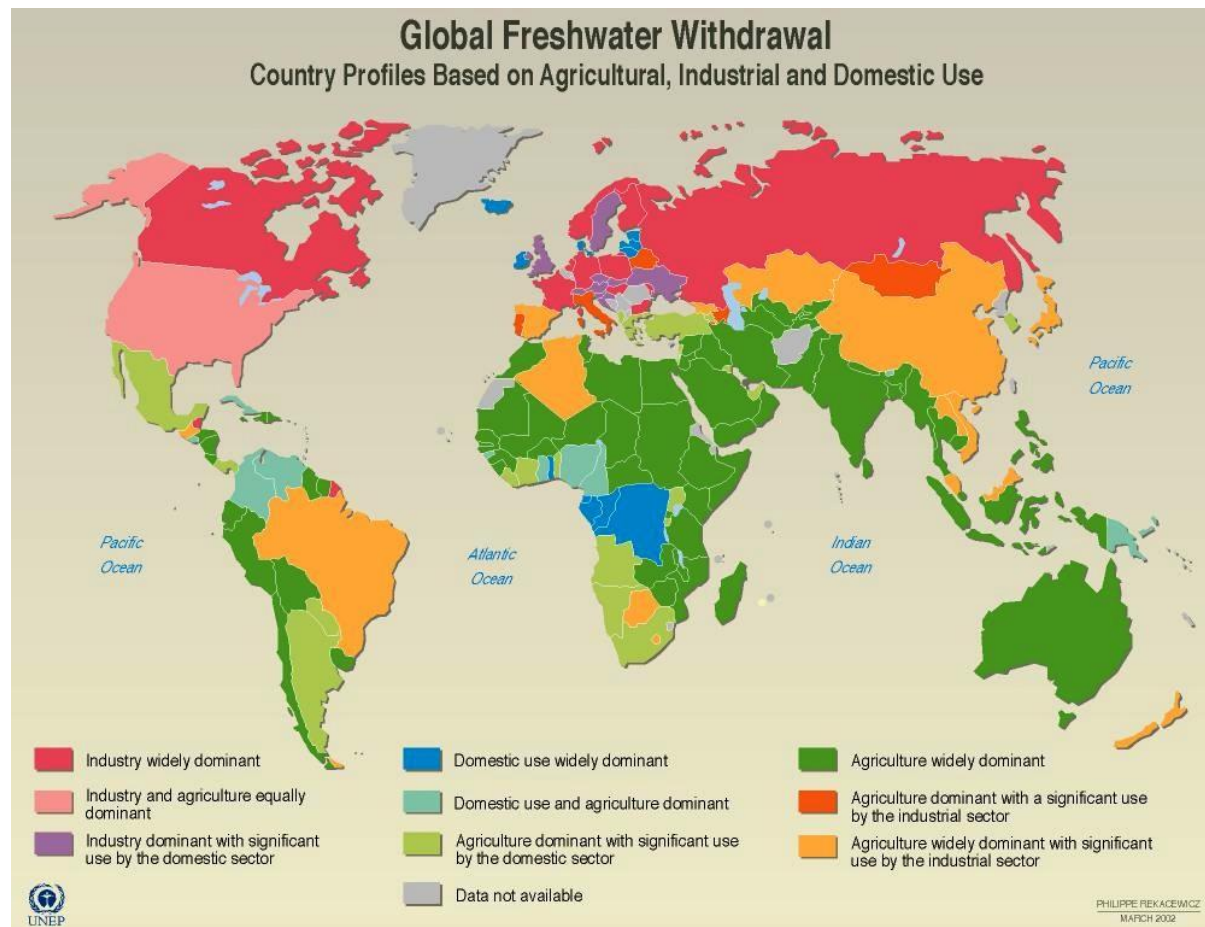
1. Introduction

Water Allocation with Declining Water Resources



1. Introduction

Major Water Use per Country

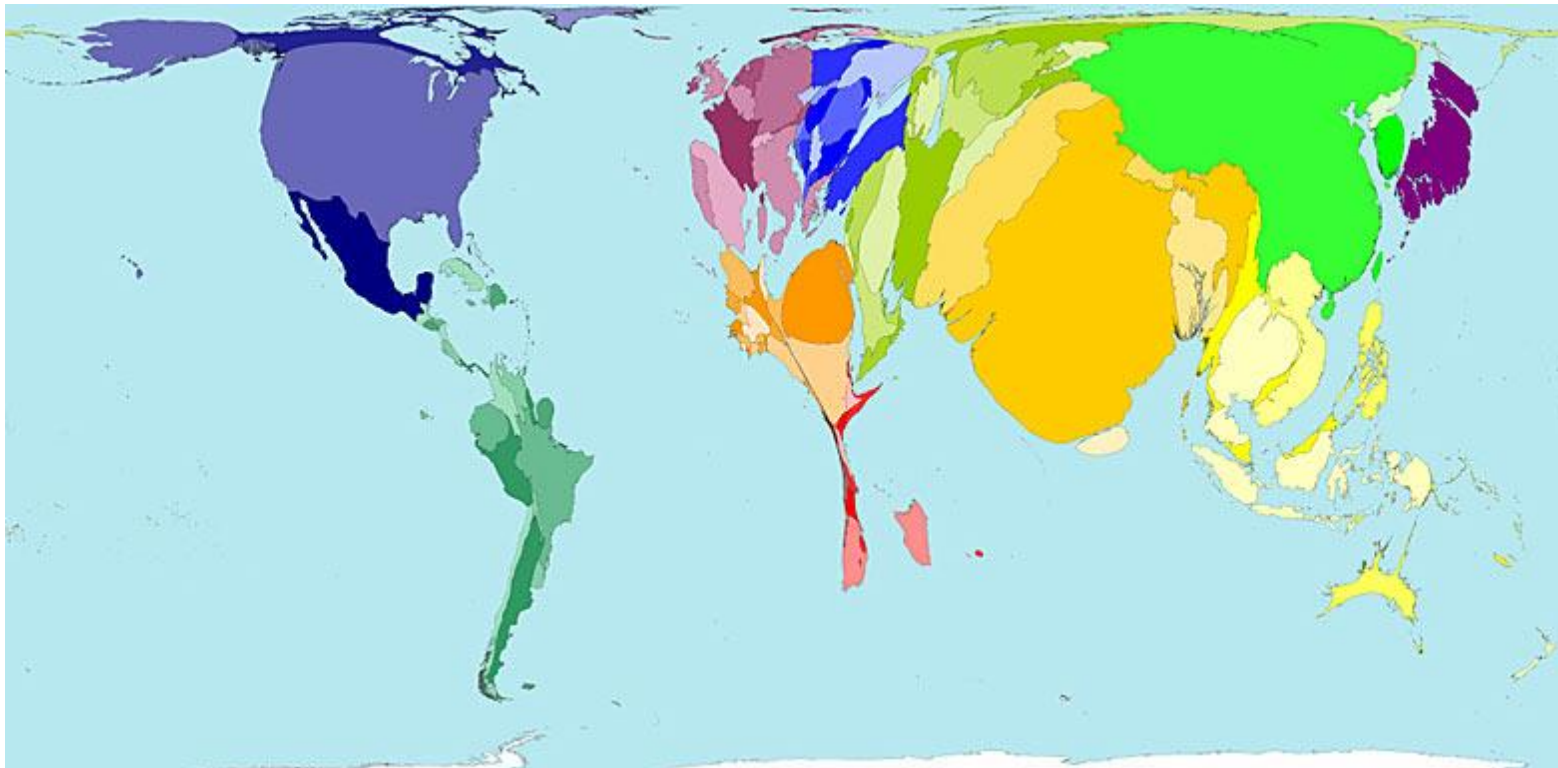


*Global freshwater withdrawal -
Country profile based on agricultural, industrial and domestic use*

Source: UNEP (2002)

1. Introduction

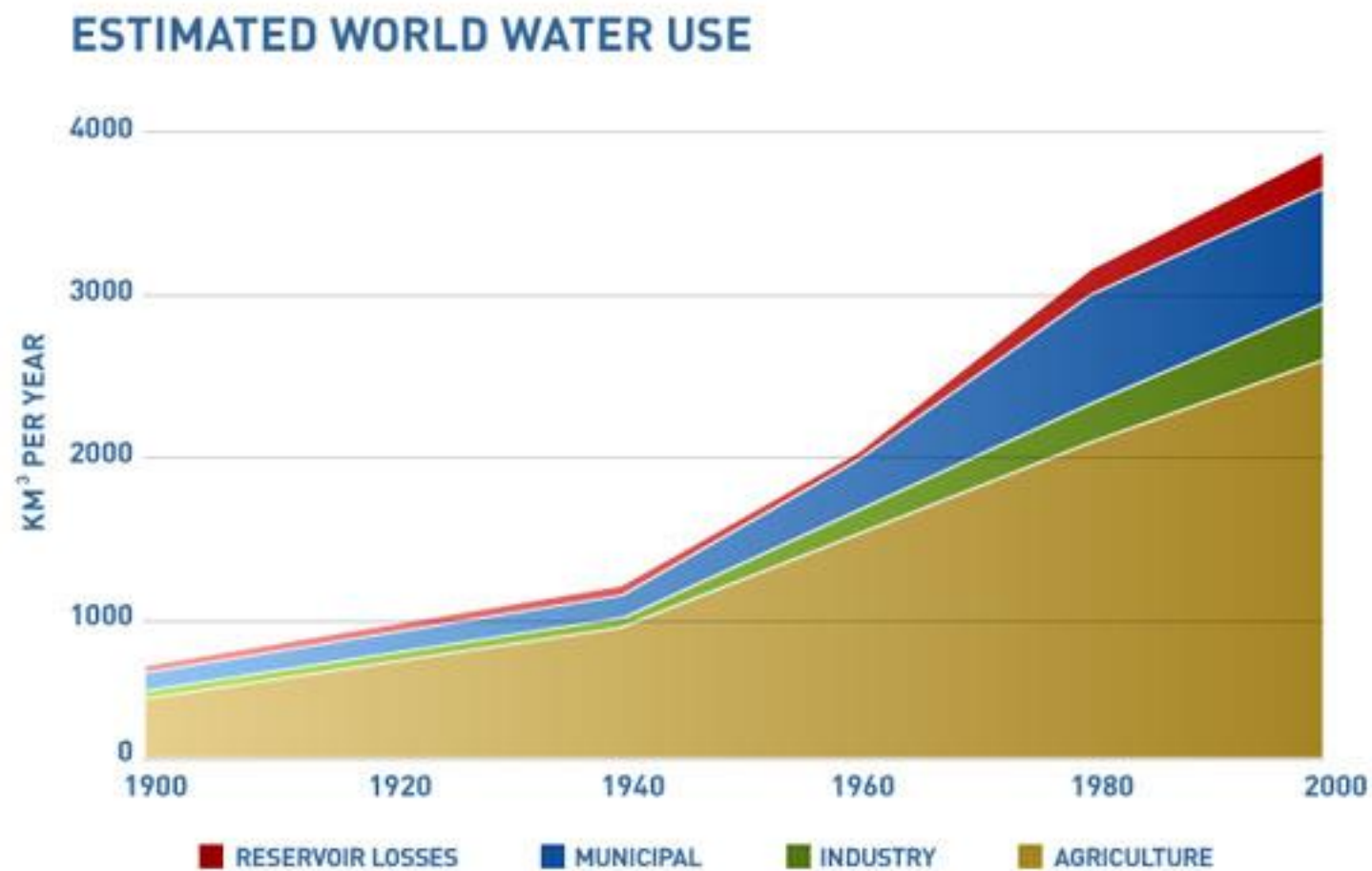
World Map According to Water Consumption



Source: http://images.forbes.com/media/2008/06/19/water_map.jpg [Accessed: 20.06.2012]

1. Introduction

History of Water Use

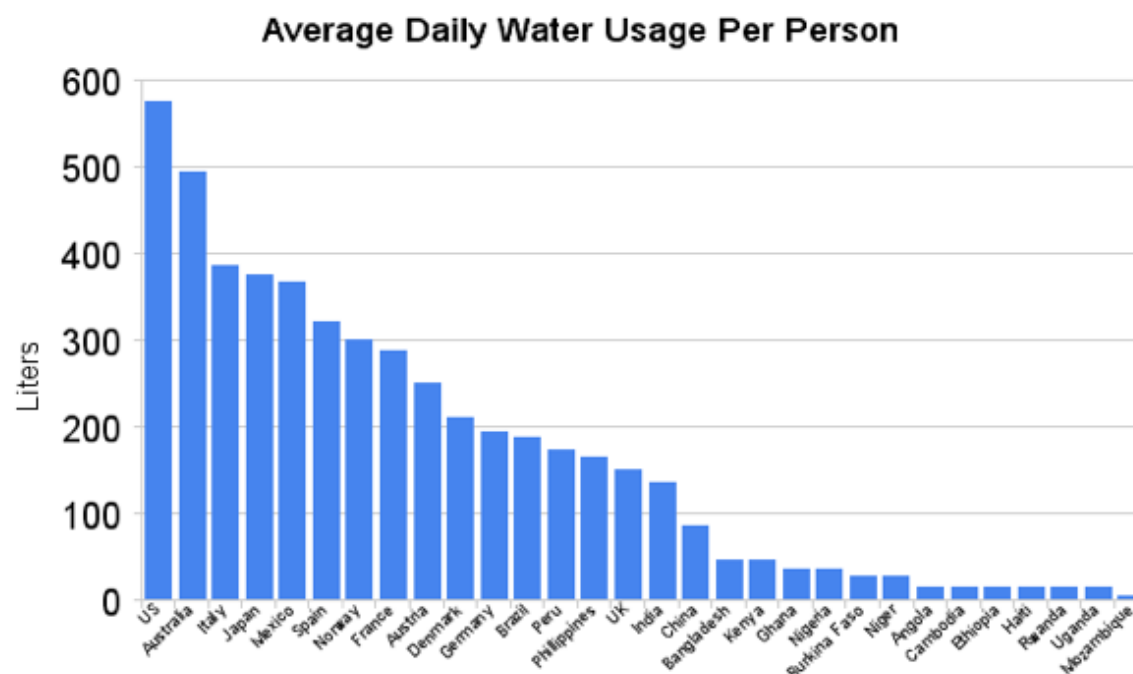
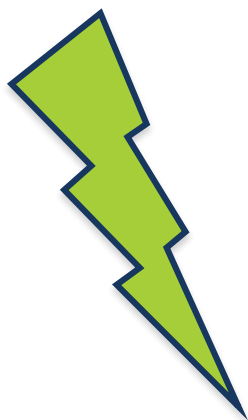


Source: <http://www.fao.org/nr/water/art/2008/waterusegraph.jpg> [Accessed: 20.06.2012]

1. Introduction

Why Optimise at Home?

- In the developed world, there is much room for improvement in **household water use**.
- According to the WHO a minimum of 25 litres per day is required to meet basic needs.

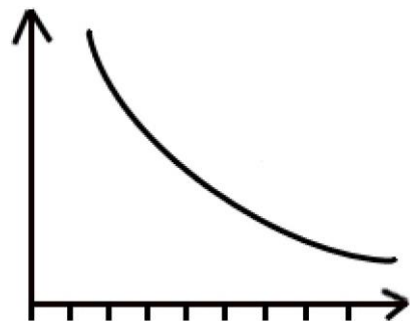


Source: https://www.e-education.psu.edu/drupal6/files/geog030/action/m9_average_daily_water_usage_per_person.png [Accessed: 20.06.2012]

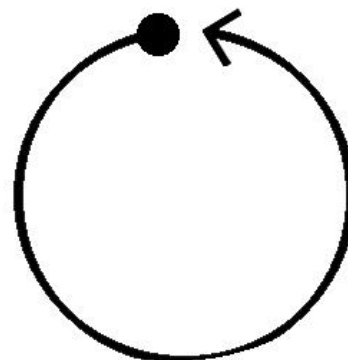
1. Introduction

The Three R's - A Concept of Natural Resources Management

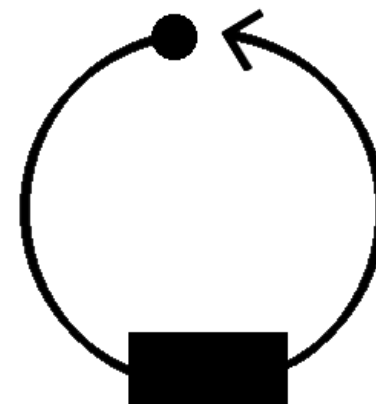
Reduce



Reuse (directly)



Recycle (treat & reuse)



Source: BRUNI (2012)

1. Introduction

Implications of R-R-R

Reduction of water consumption, Reuse, Recycle leads to:

- Reduction of pressure on water resources,
- Less demand for large water supply systems and facilities (e.g. wells, pumps, distribution networks, collection, treatment),
- Less generation of wastewater → reduces energy demand and need for collection and treatment facilities, and
- Closing the water & nutrient cycle.

2. Reduce Water Consumption at Home

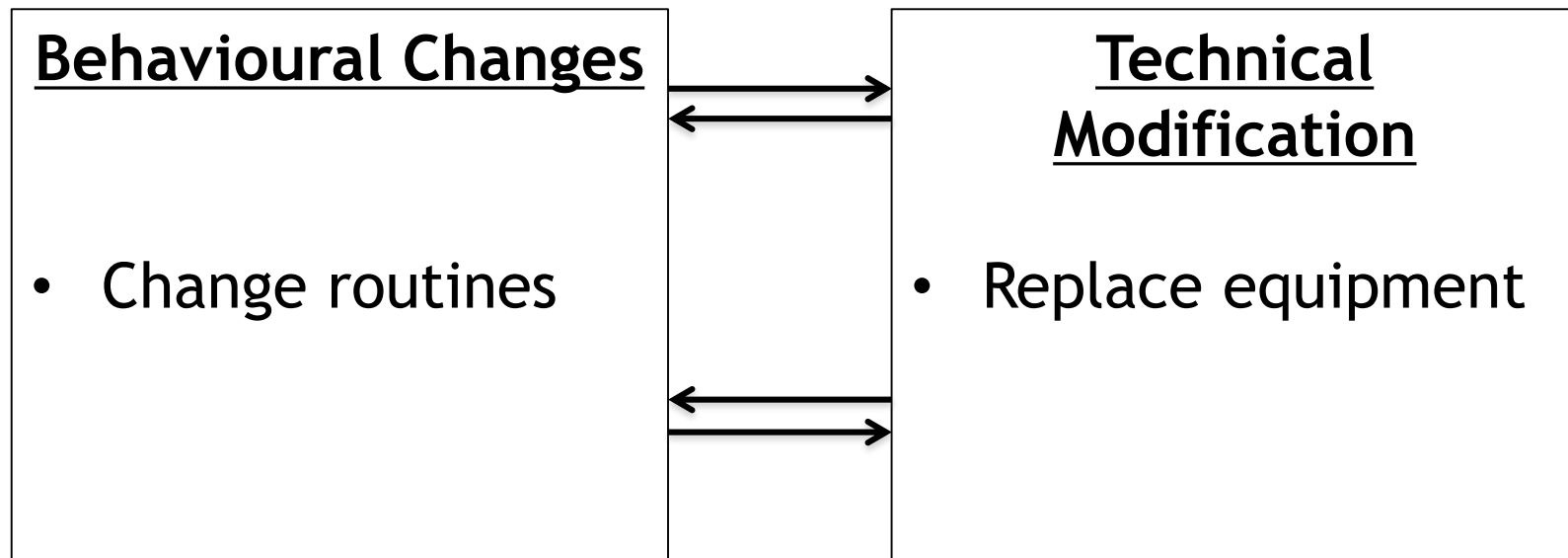
The Difficulty of Tracking Domestic Water Use in Developing Countries

- In developing countries, most water supplies are **unmetered**. In many instances, water standpipes or blocks of houses have never been fitted with meters or they have broken.
- In these cases, neither water departments nor individual end-users know how much water is used.
- Effective billing cannot take place, and water demand management plans cannot be implemented effectively.
- The calibration, repair, and replacement of meters are important components of a water conservation strategy.
- Furthermore, unlicensed use of water, water losses through broken pipes, and water wastage can only be determined if appropriate metering takes place.

FOERCH (2007)

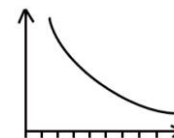
2. Reduce Water Consumption at Home

Behaviour Changes vs. Modifying Equipment



2. Reduce Water Consumption at Home

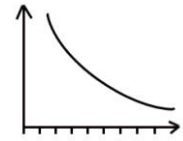
Tackle Water Saving through Diversified Strategies



	Behavioural Change	Technical Modifications
Toilet	Avoid unnecessary flushing	Use water-efficient/no-water toilet systems, check for leaks, use rainwater for flushing, etc.
Tap	Turn off tap if it is not used (while brushing teeth, razing)	Fix leaks, limit the outflow, e.g. areators, press bottoms instead of turning knob
Shower/ Bath tub	Rather shower than bath, consider reusing bathwater for gardening	Limit the outflow by using a water-efficient showerhead
Clothes washing	Only wash when necessary, wash with a full load	Use efficient washing machines
Dish- washing	<u>Machine</u> : Wash with a full load, manual pre-washing is often unnecessary <u>Manual</u> : don't wash under a running tap	Use efficient washing machines
Gardeni ng	Water in the evenings/mornings (less evaporation)	Mulching, drip irrigation instead of sprinklers

2. Reduce Water Consumption at Home

Examples of Water-Saving Equipment 1



Tap Aerator



Source:
http://waterus.com/images/aquawizard_aerator_2.jpg [Accessed: 19.06.2012]

Different types of urine diversion flush toilets.



Source: dubbletten.nu; gustavsberg.com; stman.se; roevac.de [Accessed: 19.06.2012]

2. Reduce Water Consumption at Home

Examples of Water-Saving Equipment 2



Use of rainwater for toilet flushing



Source: <http://www.groedibbles.com/wp-content/uploads/2011/11/rainwater-harvesting-techniques.jpg>
[Accessed: 19.06.2012]

Fix seeping taps and leakages



Source:
http://images03.olx.com/ui/2/13/56/24330756_1.jpg [Accessed:
19.06.2012]



Source: <http://www.stebnitzbuildersblog.com/wp-content/uploads/2011/03/fix-water-leak-reno-lg.jpg>
[Accessed: 19.06.2012]

3. Reuse Water at Home

Directly Reuse your Wastewater

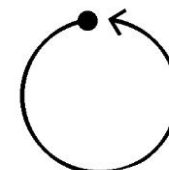
Wastewater take on many forms:

- Blackwater
- Brownwater
- Yellowwater

•Greywater (laundry, dishwashing, showering, bathing)

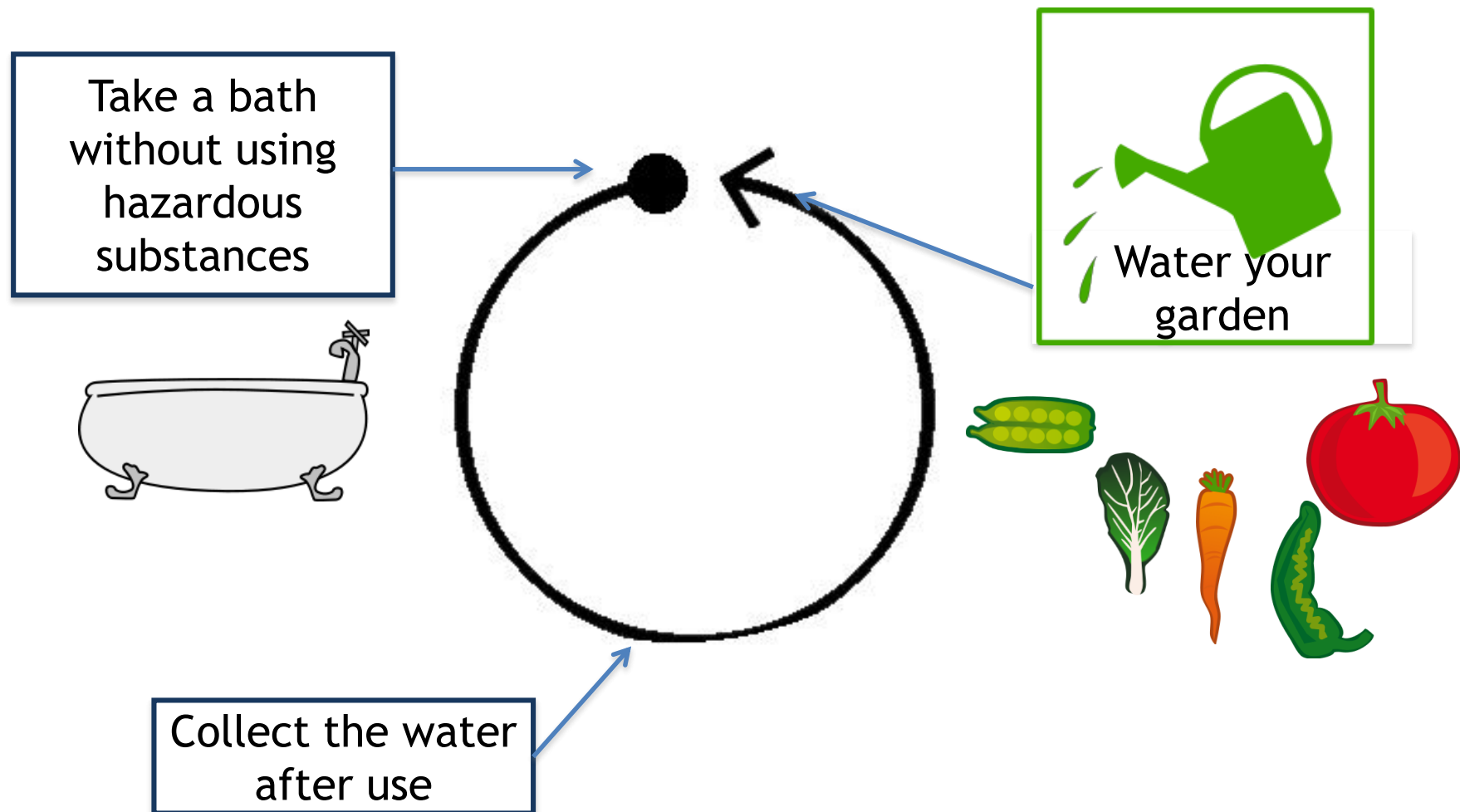
•...

For example:
Greywater can easily be reused directly
(without any treatment) for various purposes
(e.g. car washing, gardening, etc.)



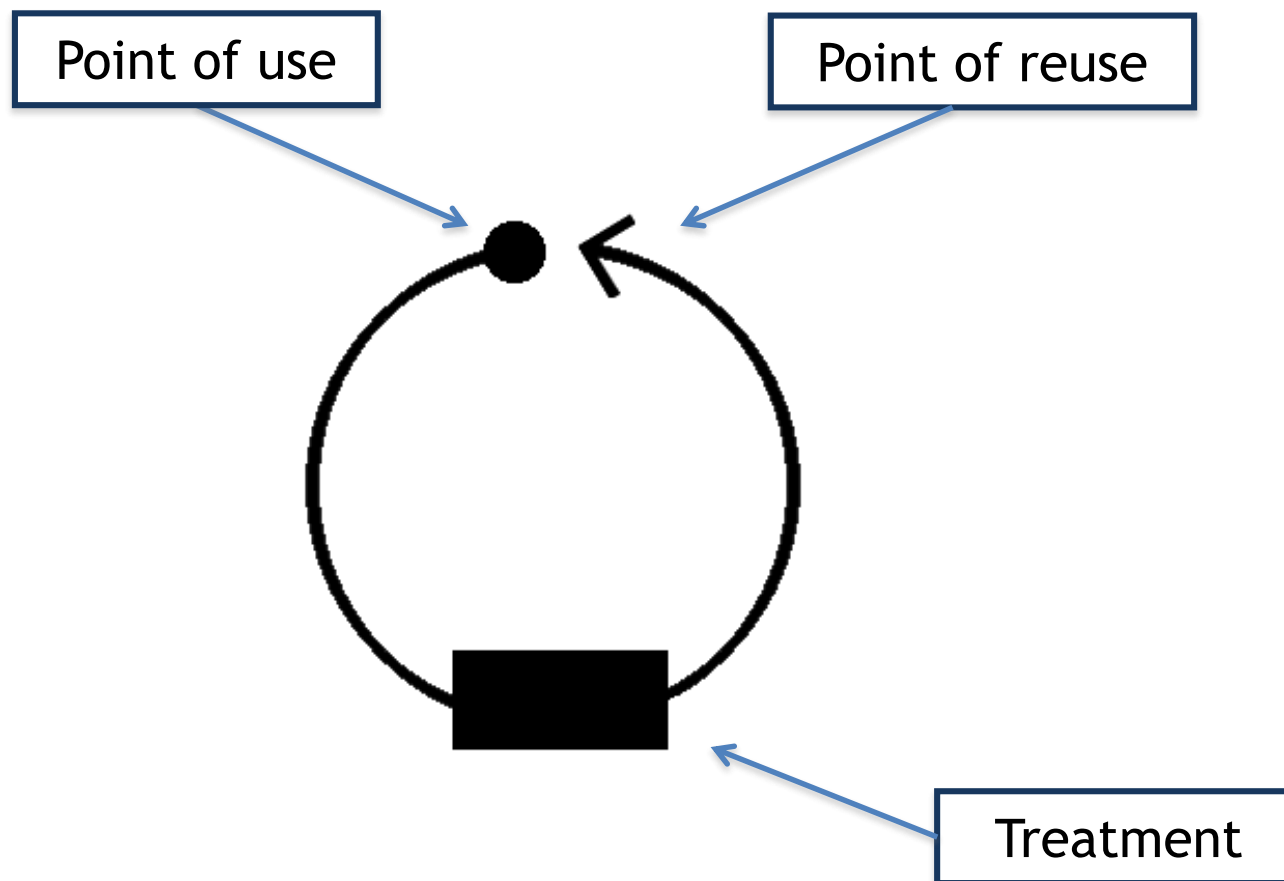
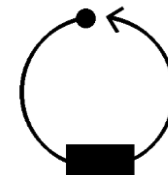
3. Reuse Water at Home

Directly Reuse your Wastewater: Example



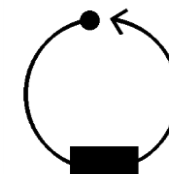
4. *Recycle Wastewater at Home*

Treat your Wastewater and Reuse It!



4. Recycle Wastewater at Home

Step 1-3



<u>Step 1</u> Water Use	Mind what you mix in your water in order to minimise treatment effort.
<u>Step 2</u> Treatment	Possible treatment options for water reuse include: waste stabilisation ponds, aerated ponds, trickling filters, vertical flow constructed wetland, hybrid constructed wetland, free-surface constructed wetland and horizontal flow constructed wetland.
<u>Step 3</u> Reuse	Different water uses require different water qualities: Only reuse water for the purpose it was treated for!

5. Limitation of Water Saving at Home

Keep Track of the Bigger Picture

- Water use at home equals about 160 litres per person per day (in Switzerland). Clearly, there is a large potential for water saving.
- However, this domestic water use does not include all the water being used for producing the food we eat, the clothes we wear, etc.
- A recent study by the WWF estimated the actual water use (water footprint) per person per day to amount 4200 litres. GNEHM (2012)

6. References

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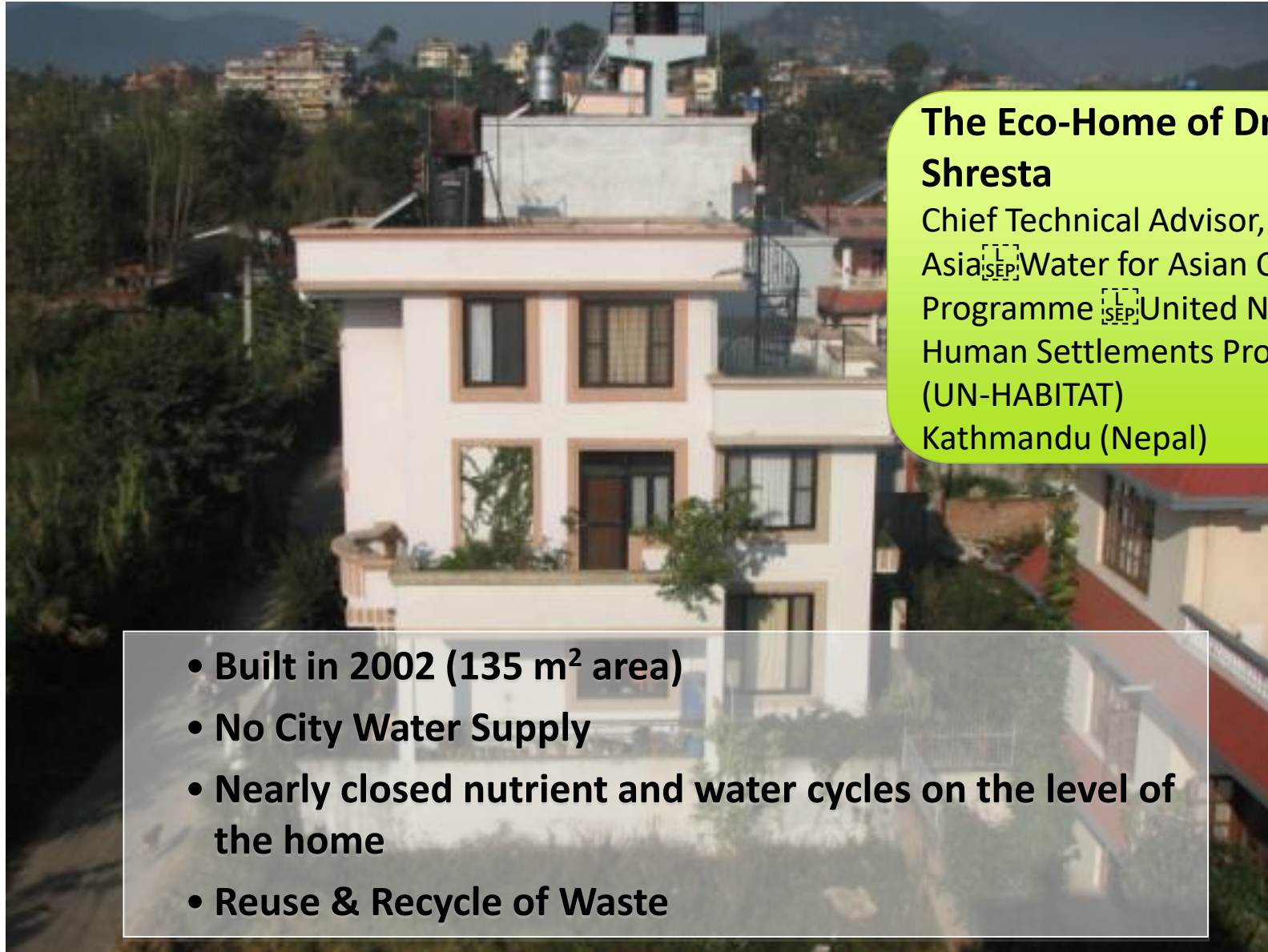


Annex 1:
**Example of a SSWM-House:
The Eco-Home**

*Dorothee Spuhler and Michael Kropac, seecon
international gmbh*

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- A7. Rooftop Gardening
- A8. Demonstration Site
- A9. References

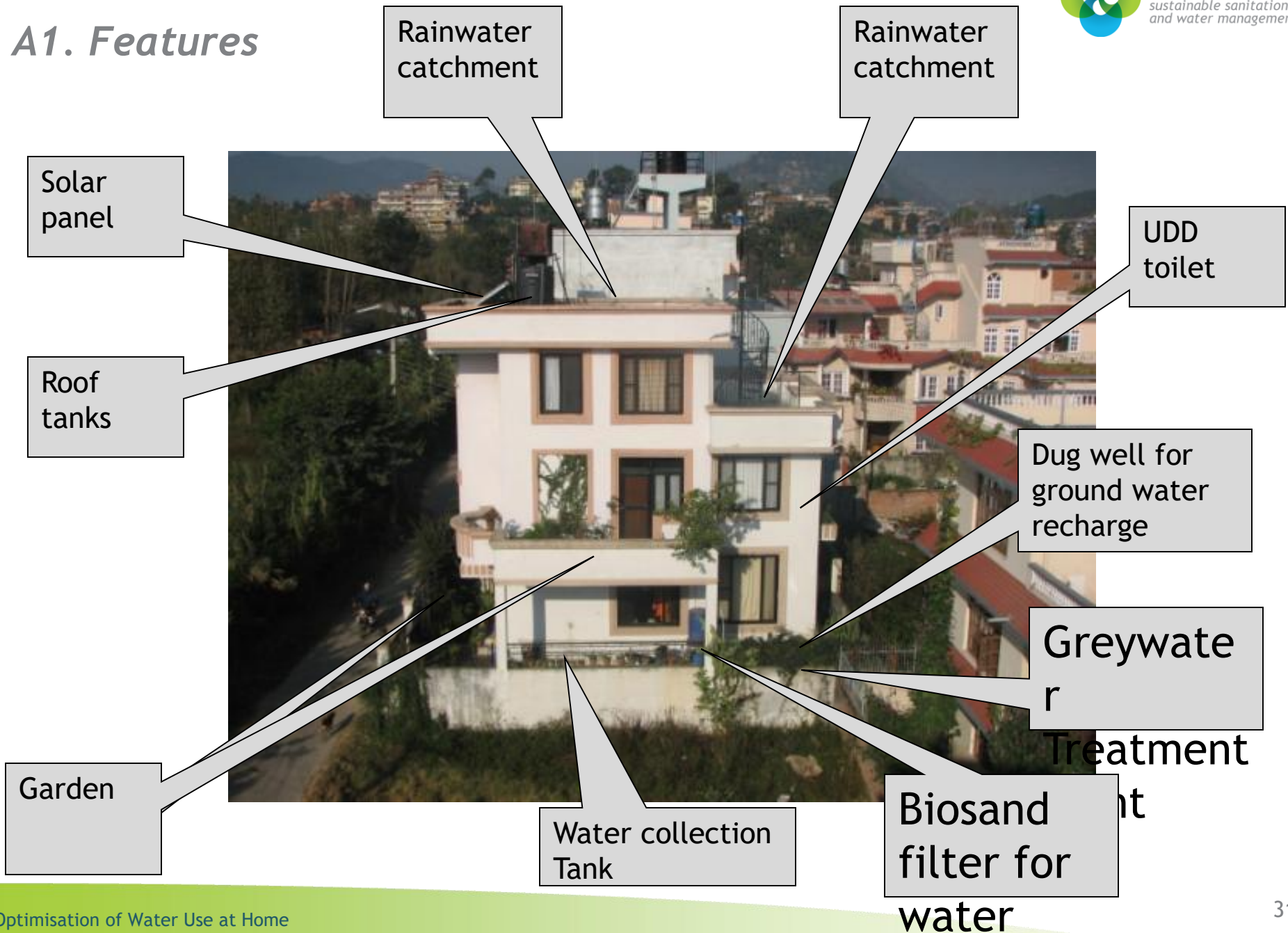


The Eco-Home of Dr. Roshan Shrestha

Chief Technical Advisor, South Asia ^{SEP}Water for Asian Cities Programme ^{SEP}United Nations Human Settlements Programme (UN-HABITAT)
Kathmandu (Nepal)

- Built in 2002 (135 m² area)
- No City Water Supply
- Nearly closed nutrient and water cycles on the level of the home
- Reuse & Recycle of Waste

A1. Features



A2. Rainwater Harvesting



Rain water for 7-8 months (April to October/November); more than 180 m³/year of rainwater harvesting potential from 90.4 m² of roof area

Source: ENPHO
32

A2. Rainwater Harvesting



Underground tank



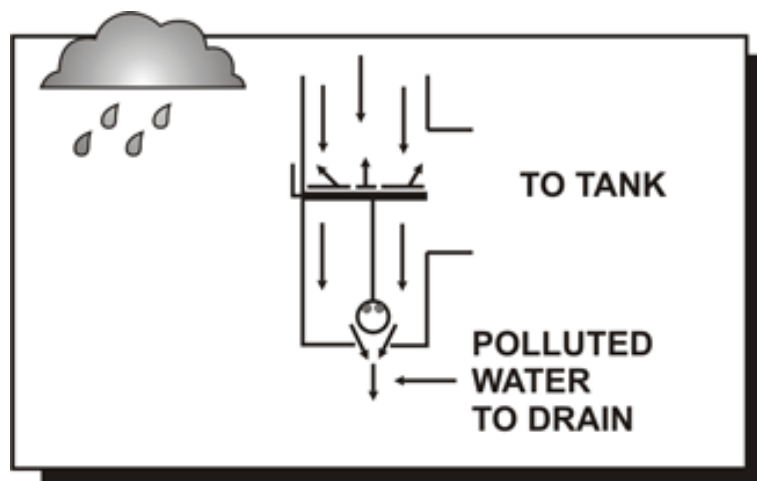
**Dug well for
groundwater collection
and recharge**

A2. Rainwater Harvesting

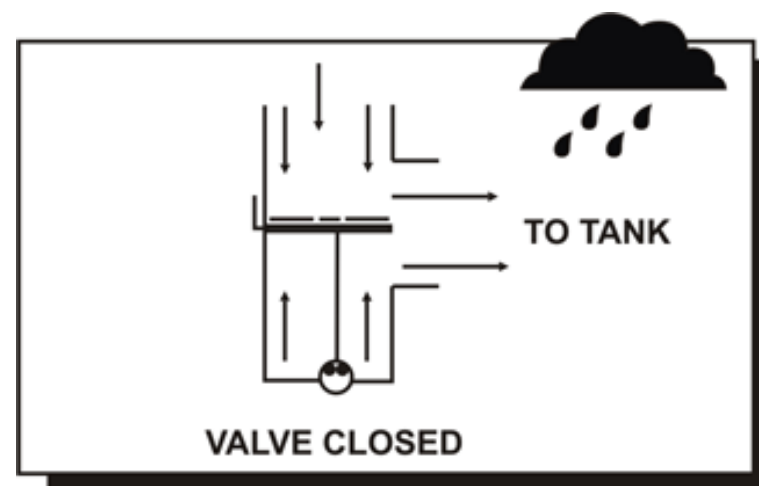


**Priced at
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A2. Rainwater Harvesting



1. When rain starts, the tainted water is dumped from the base



2. After the polluted water is dumped, the valve shuts automatically. Clean water is then diverted to the tank.

The unit closes at flow rates between 10 litres/min and 20 litres/min adjustable. Large leaves, sticks and such like are caught in a detachable screen accessible by the screw access.

Source: http://saferain.com.au/vertical_valve.html [Accessed: 20.09.2010]

A2. Rainwater Harvesting

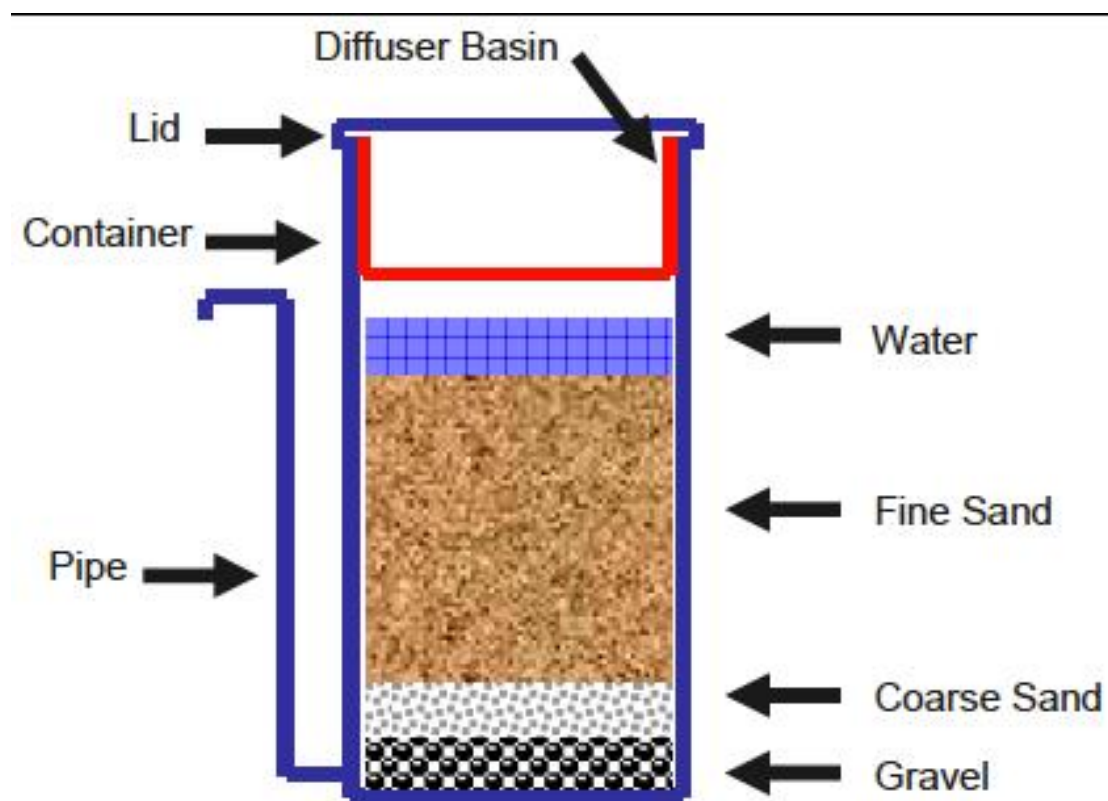


Water tank: 9000 liters



Dug well before & after rain: Storage (10' 000l + Groundwater recharge)

A3. Rainwater Harvesting - Water Purification



Water Purification: Biosandfilter

A3. Rainwater Harvesting - Water Purification



Drinking Water: SODIS (Solar Water Desinfection)

A4. Greywater Treatment and Recycling



A5. Urine-Diversion Dehydration Toilets



A5. Urine-Diversion Dehydration Toilets



Faeces
after 5 to
6 months

A6. Vermicomposting



A7. Rooftop Gardening



A7. Rooftop Gardening



A7. Rooftop Gardening



A8. Demonstration Site



A9. References

SHRESTHA, R.R. (2010): Eco Home for Sustainable Water Management: A Case Study in Kathmandu, Nepal. (=International Conference on Sustainable Sanitation: Food and Water Security for Latin America, Fortaleza, 2007). Available at: <http://www.nepal.watsan.net/page/635> [Accessed: 30.10.2010]

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