

Seminar Report

Environmental Community Awareness Seminar Series

DIRTY WATER (Contemporary Water Issues in Nepal)



Prepared by

**Asta-Ja Research and Development Centre (Asta-Ja RDC)
Kathmandu, Nepal**

Supported by

**Non-Resident Nepali Association National Coordination Council (NRNA NCC) USA,
Community Environment Academy, and Asta-Ja USA**

31 March, 2019

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1. Background

Environment pollution is a serious public concern in the city of Kathmandu in Nepal. Rapid, but unplanned, urbanization, increasing number of vehicles and energy consumption, emissions from industries, heating, and burning woods and other trash materials; trans-boundary air pollution, chemical uses in agriculture, poor and failing septic systems, exposed ground surfaces leading to excessive dust in the air, poor disposal of solid and hazardous wastes, and other activities are leading to environmental degradation at an alarming rate. Environmental pollution has not only threaten public health, it is adversely affecting the aesthetics, tourism, ecological integrity, and economic activities in the city. Unsafe disposal of hazardous waste, e-waste, and biomaterials is spreading highly toxic substances which are often long lasting in the environment. City inhabitants are already experiencing nontrivial impact of geometric growth of contaminants in air and water, and, there is a strong public call for immediate control on environmental pollution and ecological restoration.

As envisioned by the Constitution of Nepal 2015 (Part 3, Article 30), clean living environment is the fundamental right of the citizens of Nepal. In order to improve environmental conditions in the country, the Government of Nepal has declared a five-year environmental campaign called 'Nepal Clean Environment Campaign'. The campaign aims at controlling environmental pollution in the rural and urban areas, managing solid-waste disposals, and increasing green areas and public parks. However, due to very high level of environmental degradation coupled with very low level of public awareness and the lack of appropriate corrective measures, it is quite challenging for the Government of Nepal in achieving environmental goals within the stipulated timeframe of Nepal Clean Environment Campaign.

To contribute to the governmental campaign of controlling environmental pollution in the rural and urban areas in Nepal, Asta-Ja Research and Development Centre (Asta-Ja RDC) Nepal has initiated a project called "Environmental Community Awareness Seminar Series", with the funding support from Community Environment Academy & Non-Resident Nepali Association National Coordination Council (NRNA NCC) USA and technical support from Asta-Ja USA.

Four seminars have been planned in this series. The first three seminars are on a smaller-scale focusing on air, water, and flooding, and the final seminar will be on a larger-scale with a comprehensive view of environmental pollution in Kathmandu. It is expected that students from two US Universities, University of Louisiana at Lafayette, Louisiana, and The University of Arizona, Tucson, Arizona, along with students, teachers, faculty members, researchers and other stakeholders from Nepal will attend the final seminar.

2. Objectives and Target Groups

The overall objective of the seminar series is to raise community awareness on environmental pollution in Kathmandu Valley targeting primarily student communities representing both Colleges and High Schools. Special emphasis has been given to the effects of Global Climate Change on the environment in Kathmandu valley.

3. The First Seminar on 'Dirty Water'

The first seminar in this series was held on the topic of 'Dirty Water' on 31st March 2019. Twenty five 12th Graders and two teachers from Gyanodaya Higher Secondary School, Kathmandu, and four individuals from Asta-Ja RDC were among the participants. Dr. Udhab Khadka, Associate Professor of Tribhuvan University, Kathmandu, was the resource person for the seminar. Dr. Khadka has a long teaching and research experience on water pollution.

General Secretary of Asta-Ja RDC, Dr. Bishnu Chapagain, highlighted the importance of seminar in raising community awareness for addressing water pollution problem of Kathmandu valley. Asta-Ja RDC Executive Member Mr. Bishnu Dayal Singh coordinated and facilitated the seminar.

3.1 Contents

The PowerPoint presentation from Dr. Udhab Khadka included:

- Objectives and programs of Nepal Clean Environment Campaign
- Right of clean environment in the Constitution of Nepal 2015
- Global water cycle and natural hydrological cycle
- Distribution of various forms of water and freshwater available for life
- Flow of water from source (Himalaya) to plains and ultimately ocean
- Human impacts on freshwater
- Water use by various sectors (global/local) and (increased) trend of use
- Water consumption disparity among developed and underdeveloped world (countries)
- Water scarcity and stress trend and scenario
- Possible consequences of groundwater over-exploitation
- Groundwater depletion in shallow and deep aquifer in Kathmandu Valley
- Water, sanitation and hygiene issues in Nepal
- Nepal's commitment for Sustainable Development Goal (SDG-6) and target set for 2030
- Sustainable urban water cycle/management

Dr. Khadka emphasized degradation of water quality due to anthropogenic activities including industrial production, municipal sewer, waste disposal, and agricultural runoff. Population growth, industrialization, intensive agriculture, increased living standard and changing life style have dramatically increased the demand for freshwater resulting into shrinkage of potable freshwater resources across the globe. Furthermore, current uncertainty created by global climate change has further aggravated the problems related to water.

Key messages communicated to the participants included were:

- Water resource is a finite and vulnerable to pollution as well as climatic change.
- Demand for fresh water is increasing over the time period, while supply sources is shrinking due to ever increasing population, industrialization, urbanization, over abstraction and unsustainable utilization.
- Public health and well-being is dependent on quality of water.
- Water scarcity with stressed population is increasing over the time.
- Public awareness on water conservation and sustainable use approaches need to be enhanced.
- More sustainable urban water cycle/management need to be adopted.

3.2 Discussions

Floor was open for discussion following PowerPoint presentation from the resource person. Questions asked by the participant students during the discussion session were:

- How is urbanization affecting water resources in Kathmandu and Nepal?
- How is water quality linked to public health and quality of life?
- How can we clean the Bagmati River and other polluted rivers in Kathmandu valley?
- How safe is tanker water supplied by the private companies for drinking?
- What precautionary measures should be taken to protect general public from waterborne diseases?

The resource person responded very well to all the questions and concerns raised by the student participants in the seminar.

4. Conclusions

The seminar was very successful and effective in conveying the message of water pollution to the participants. Student participants gained knowledge on water resources specifically on its availability, increasing demand and shrinking water sources, water pollution, water conservation, linkages of water with livelihood, hygiene, sanitation and overall prosperity. Student participants were very curious on the issue of the impacts of water pollution on public health. All participants realized the responsibility of all stakeholders including students and citizens to support and compliment environmental awareness programs of the campaign undertaken by the government of Nepal for meeting the goal of clean, green and prosperous Kathmandu valley and Nepal.

Annex 1: Photos of Seminar on Dirty Water





Annex 2: PowerPoint Slides

**Environmental Community Awareness
Seminar Series**

**Gyanodaya Higher Secondary School
Kathmandu**

Contemporary Water Issues

**Organized by
Asta-Ja RDC, Nepal**

**Supported by
Asta-Ja RDC, USA**

31 March, 2019 (१७ चैत्र २०७५)

सामुदायिक वातावरणीय सचेचना अभिवृद्धि संगोष्ठी



**अष्ट ज अनुसन्धान तथा विकास केन्द्र
काठमाण्डौ, नेपाल**

१७ चैत्र, २०७५ (३१ मार्च, २०१९)

Environmental Community Awareness Seminar Series



Contemporary Water Issues

Udhab Raj Khadka, PhD
TU-CDES

31 March, 2019 (१७ चैत्र २०७५)



“अष्ट ज”

जल, जमिन, जंगल, जडिवुटी,
जनावर, जनशक्ति, जराजुरी, जलवायु

Principles of Asta-Ja

- Principle 1. Community awareness.
- Principle 2. Community capacity-building.
- Principle 3. Policy advocacy.
- Principle 4. Interrelationships and linkages.
- Principle 5. Comprehensive assessment.
- Principle 6. Sustainable technologies and practices.
- Principle 7. Institutions, trade, and governance.
- Principle 8. Sustainable development and socio-economic transformation.



नेपाल स्वच्छ वातावरण महाअभियान २०७५

लक्ष्य (Aims)

❖ शहरी तथा ग्रामिण क्षेत्रमा प्रदुषण नियन्त्रण, फोहरमैला व्यवस्थापन, हरियाली व्यवस्थापन ।

उद्देश्य (Objectives)

- ❖ जल, वायु तथा ध्वनी प्रदुषण मुक्त सफा, स्वस्थ शहर तथा समुदाय,
- ❖ हरियाली वृद्धि (नदीकिनार क्षेत्र, खाली क्षेत्र, नहरकिनार आदीमा वृक्षारोपण, फलफुल खेती)।
- ❖ सम्बद्ध सरोकारवालहरूसंगको साभेदारीमा फोहरमैला व्यवस्थापन ।



नेपाल स्वच्छ वातावरण महाअभियान २०७५

कार्यसम्पादन सिद्धान्त (Working Principle)

- ❖ विकास तथा वातावरणबीच सन्तुलन,
- ❖ नेपाली मौलीक संस्कृति तथा सभ्यताको पहिचान,
- ❖ दीगो हरित विकास,
- ❖ प्रदुषणकर्ता शुल्क (Polluters Pay Principle),
- ❖ वातावरण संरक्षण तथा संम्वर्धनमा नागरिक दायित्व तथा कर्तव्य, सहकार्य तथा समन्वय ।

कार्यक्रम

- ❖ सचेतना अभिवृद्धि, फोहरमैला व्यवस्थापन, प्रदुषण नियन्त्रण, हरियाली वृद्धि ।



Clean Environment

नेपालको संविधान २०७२

भाग ३: मौलिक हक र कर्तव्य

धारा ३०

स्वच्छ वातावरणको हक : (१) प्रत्येक नागरिकलाई स्वच्छ र स्वस्थ वातावरणमा बाँच्न पाउने हक हुनेछ ।

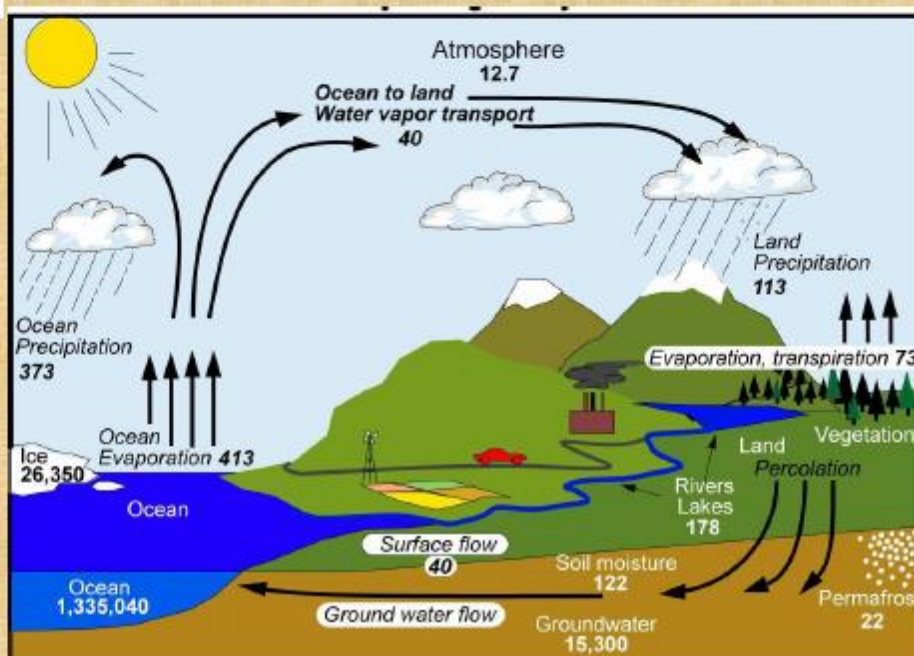
(२) वातावरणीय प्रदूषण वा हासबाट हुने क्षतिबाट पीडितलाई प्रदूषकबाट कानून बमोजिम क्षतिपूर्ति पाउने हक हुनेछ ।

❖ Environment

- ❖ Water (Water, Sanitation and Hygiene)
- ❖ Air
- ❖ Land/Soil
- ❖ Noise



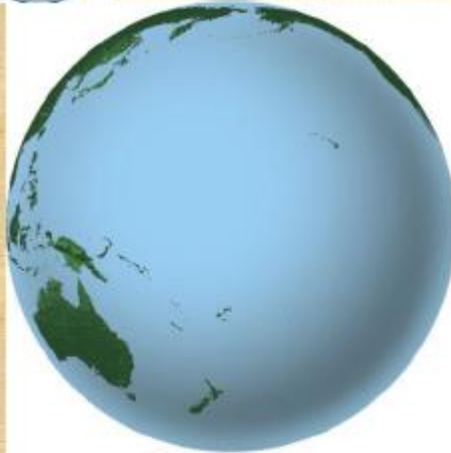
Global Water Cycle: Fixed Volume



Units: Thousand cubic km for storage, and thousand cubic km/yr for exchanges



The Ocean (Blue) Planet



Ocean hemisphere



Land-ocean hemisphere

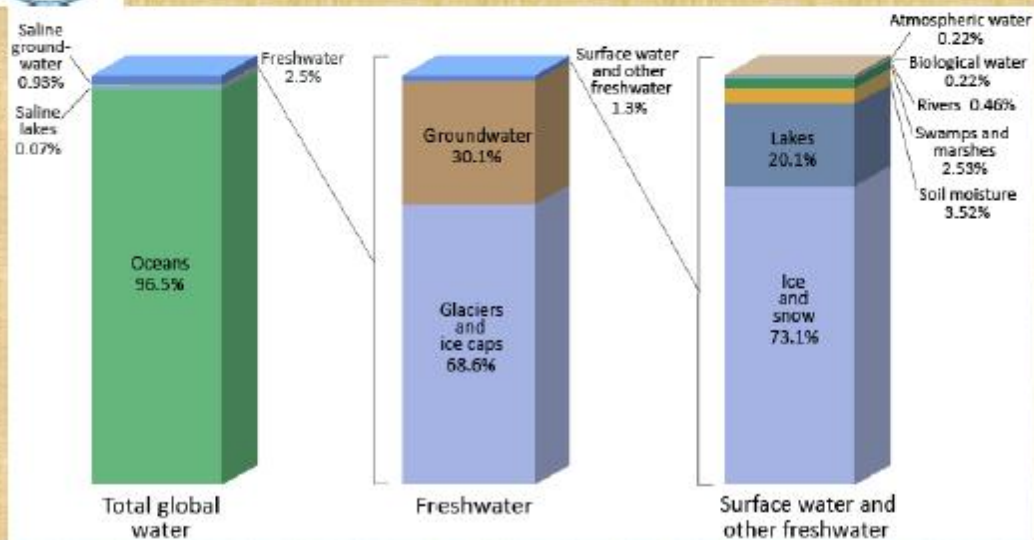
© Cengage Learning

About 71% of the Earth's surface is water-covered.

Is water scarce resource?



Global Distribution



Is water abundant resource?



"Water is the driving force in nature"- Leonardo da Vinci

"By means of water, we give life to everything"- Koran

पृथिव्यां त्रीणि रत्नानि जलमन्नं सुभाषितम् ।
मूढैः पाषाणखण्डेषु रत्नसंज्ञा प्रदीयते ॥

There are three jewels on earth: **water**, food, and adages. Fools, however, regard pieces of rocks as jewels.

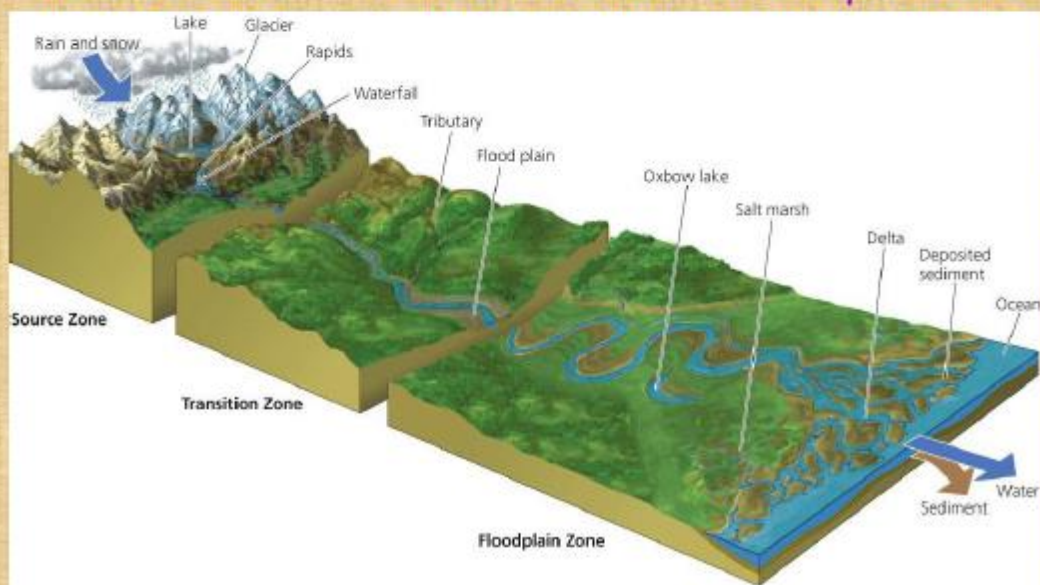


Downhill Flow of Water: Three zones

i. Source zone

ii. Transition zone

iii. Floodplain zone





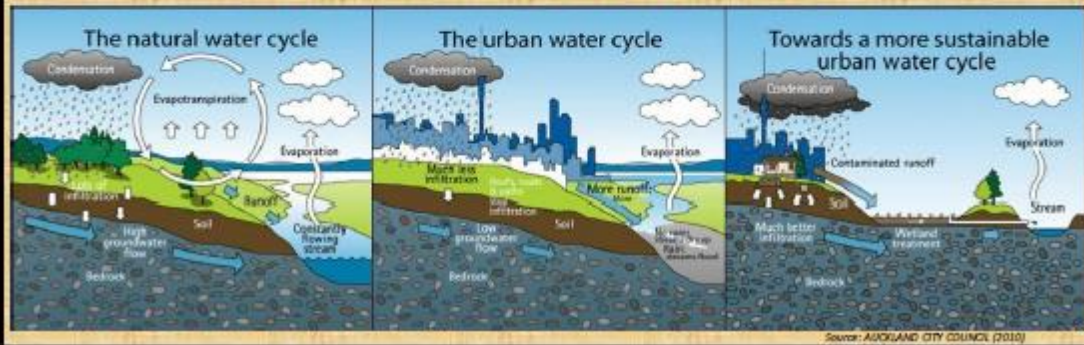
Human Influence on the Water Cycle

Do we influence the hydrological cycle substantially?

Main drivers for the increasing pressure on water resources:

- ❖ Population growth
- ❖ Increasing living standards
- ❖ Urbanisation

Influences on the Water Cycle in Cities

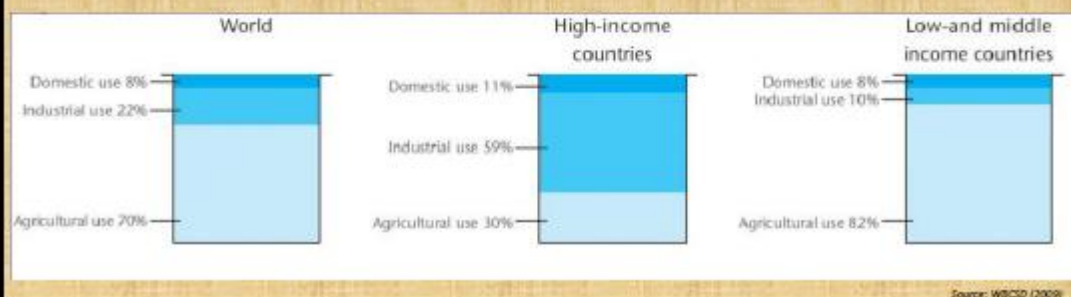


Water Uses: Where the Water ends up being used

The consumption pattern of water use is influenced by:

- ❖ Living standards
- ❖ Climate conditions

Composition of water use in different countries



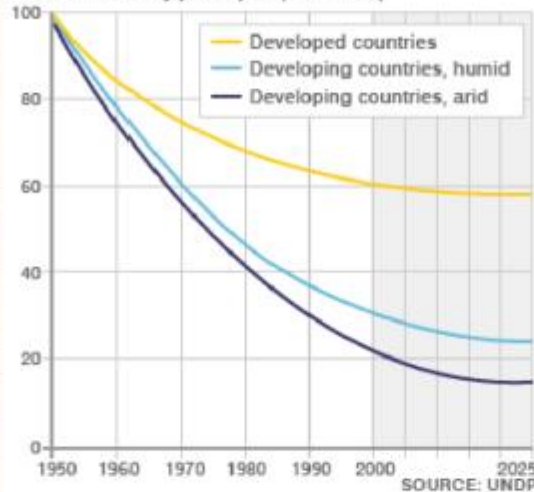


Water Available

BBC NEWS

In graphics: Water trends

Water availability per capita (1950=100)



How much is available

The overall availability of water per person has fallen markedly since 1950, according to UN figures.

Developed countries have fared better than the developing world, largely because population growth has been significantly lower.

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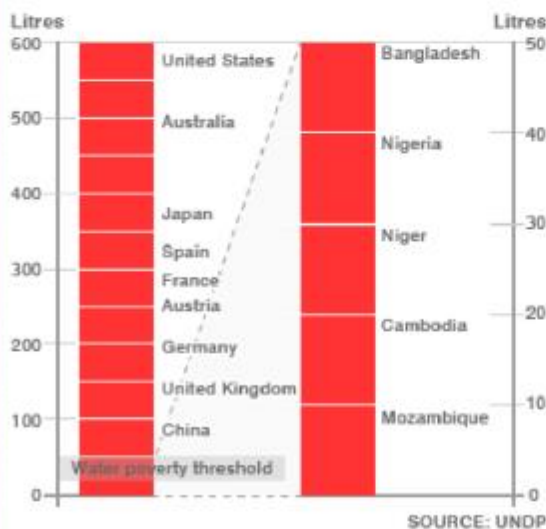
http://news.bbc.co.uk/2/shared/spl/hi/pop_ups/08/sci_nat_water_trends/html/3.stm



Consumption/Capita/Day

BBC NEWS

In graphics: Water trends



How much we use

People use vastly different amounts of water in their daily lives. The average US citizen uses nearly 600 litres each day, whereas people in some of the world's poorest countries must make do with less than 10% of that.

The single biggest reason for the discrepancy is the scale of a country's infrastructure.

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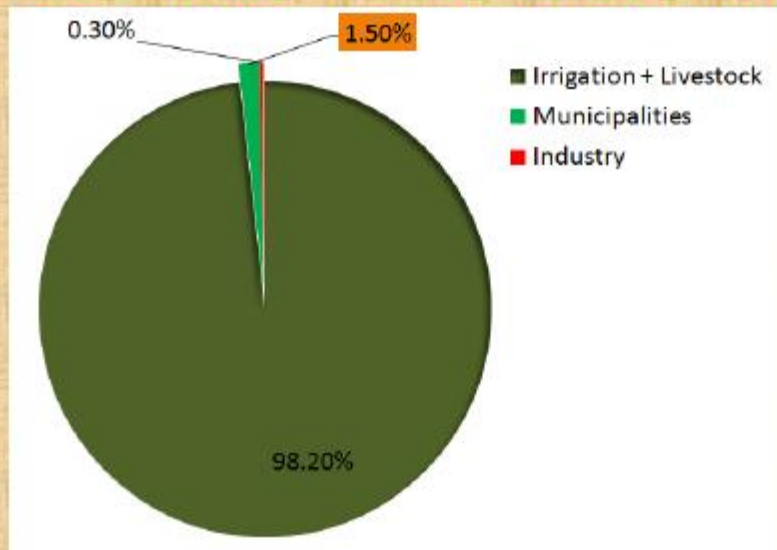
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http://news.bbc.co.uk/2/shared/spl/hi/pop_ups/08/sci_nat_water_trends/html/3.stm



Water Uses: Where the Water ends up being used



2019-04-01

Fig: Graphical representation of sectoral use of water in Nepal

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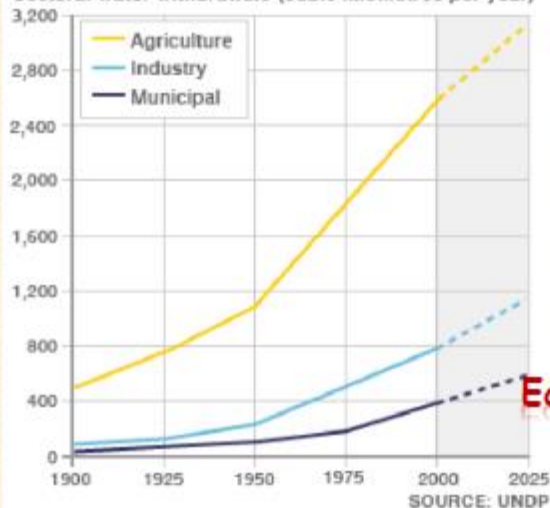


Water Use by Sectors

BBC NEWS

In graphics: Water trends

Sectoral water withdrawals (cubic kilometres per year)



What we use it for

Globally, agriculture remains the biggest user of water.

As societies industrialise and move away from a farming-based economy, they may reduce their water consumption. However, on a global basis, farming is projected to need more water in future as the climate warms and the world's food requirements rise.

Ecosystem Use

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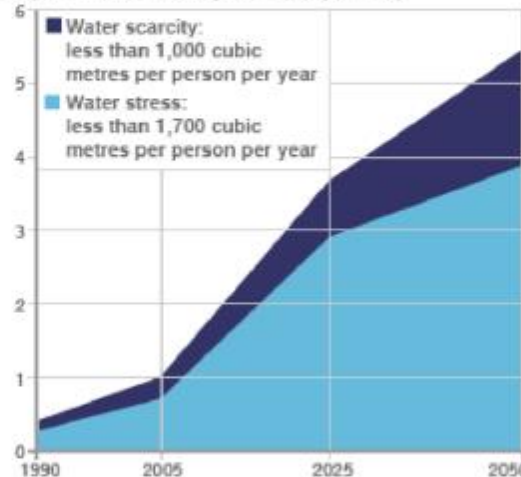


Water Trend

BBC NEWS

In graphics: Water trends

People in water scarcity or stress (billions)



SOURCE: UNDP

Running dry?

The number of people living in "water stress" and "water scarcity" is projected to increase in future, with most of the rises taking place in poorer countries.

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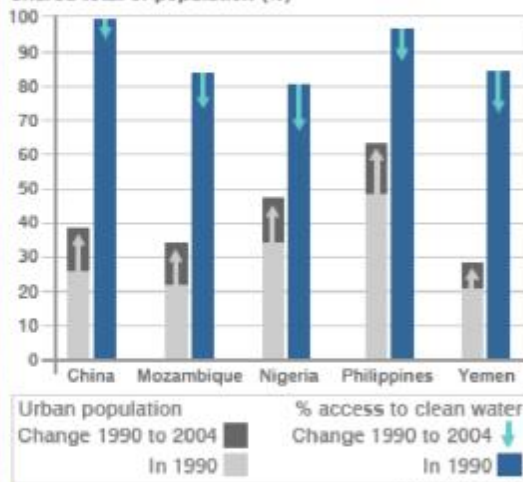


Water Trend

BBC NEWS

In graphics: Water trends

Shared total of population (%)



SOURCE: UNDP

Urban islands

More than half of the world's people now live in cities.

But not all governments are providing infrastructure to meet the expanding urban demand. In many developing countries, as the size of a city grows, the proportion of people in it with access to clean water goes down.

All figures adapted from UNDP Human Development Report 2006

Click below for more images

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http://news.bbc.co.uk/2/shared/spl/hi/pop_ups/08/sci_nat_water_trends/html/3.stm

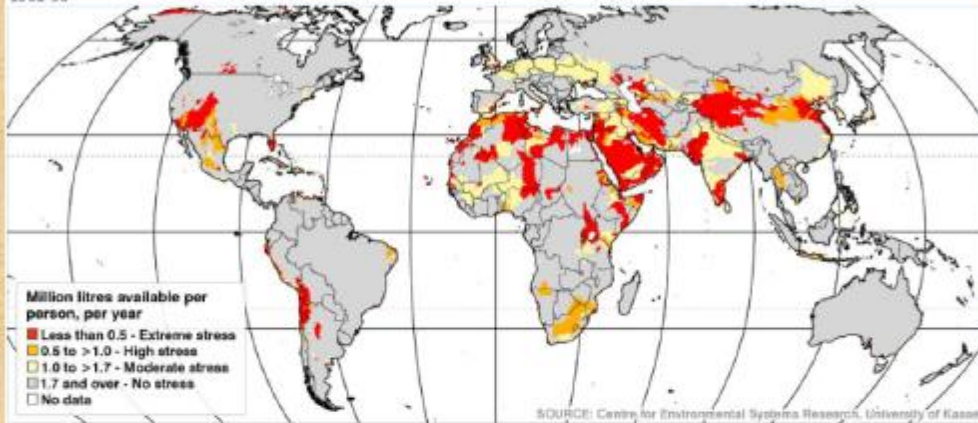


Water Stress

Mapping future water stress

HOW WATER AVAILABILITY MAY CHANGE, AS TEMPERATURES, POPULATION AND INDUSTRIALISATION INCREASE

1991-99



1 of 4

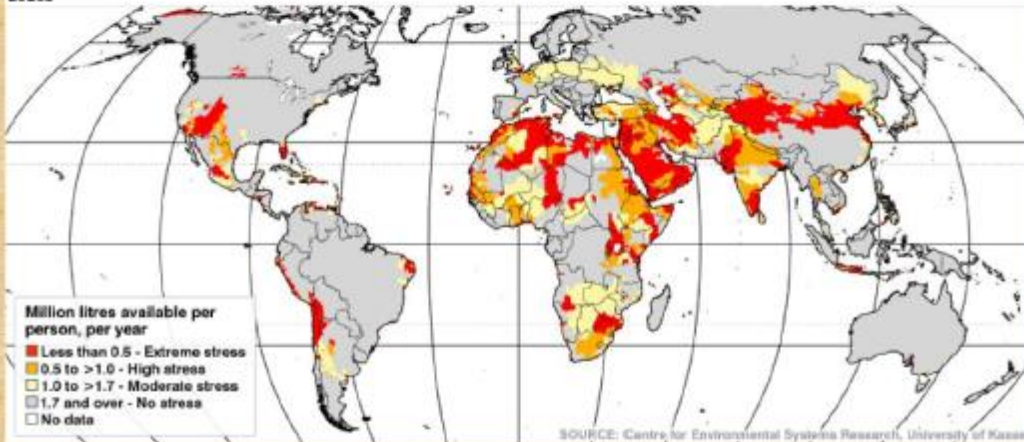
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Water Stress

HOW WATER AVAILABILITY MAY CHANGE, AS TEMPERATURES, POPULATION AND INDUSTRIALISATION INCREASE

2020s

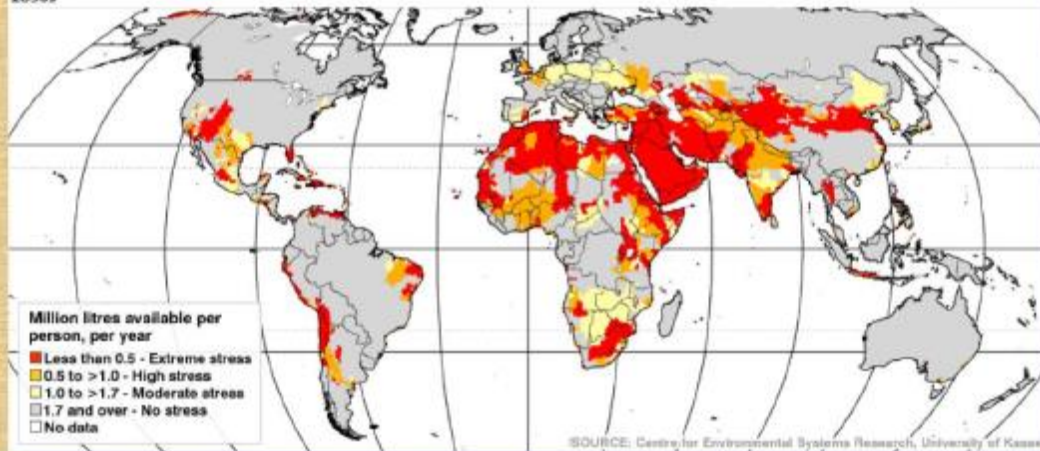




Water Stress

HOW WATER AVAILABILITY MAY CHANGE, AS TEMPERATURES, POPULATION AND INDUSTRIALISATION INCREASE

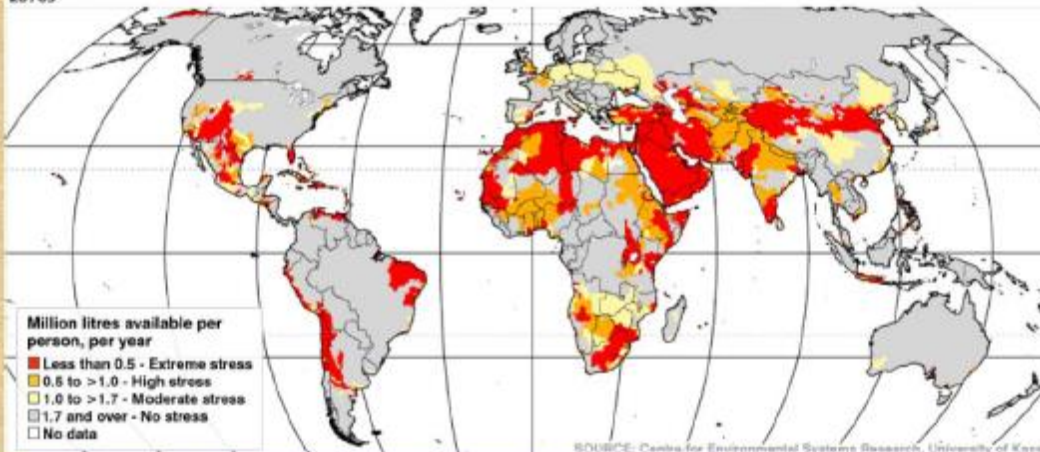
2050s



Water Stress

HOW WATER AVAILABILITY MAY CHANGE, AS TEMPERATURES, POPULATION AND INDUSTRIALISATION INCREASE

2070s





Land Subsistence in California



Photo Credit: USGS/Justin Brandt
<https://water.usgs.gov/ogw/highlights/2013-08-01.html>
 (Accessed 30 March, 2019)



Dr. Joseph F. Poland (pictured)
<https://water.usgs.gov/edu/earthgwlandsubside.html>



Deep Aquifer Depletion in Selected Sites of KTM During Dry Season

Groundwater (shallow and deep aquifers) estimated to be 8.8 BCM per annum (WECS, 2011).

Locations	Water Level, 1976		1999	Decline (S/P)
	Static/Pumped (m)	S/P (m)	S/P (m)	
Bansbari	48.08/67.6	80.63/136.14	32.55/68.54	
Baluwatar	Flowing/21	22.41/30	22.41/9.0	
Pharping	Flowing/25	13.0/44.0	13.0/19.0	



WASH (Water, Sanitation and Hygiene)

पानी, स्वस्थ तथा सरसफाई



WASH

- ❖ **WASH** (Water, Sanitation and Hygiene)
- ❖ Universal, affordable and sustainable access to **WASH** is a key public health issue.
- ❖ **It is the focus of SDG-6.**
- ❖ Clean water, basic toilets and good hygiene practices are essential for the survival and development of children.



WASH: Global Scenario

- ❖ At present, around 2.4 billion people do not use improved sanitation,
- ❖ 2.1 billion people worldwide lack access to safe, readily available water at home, and
- ❖ 4.4 billion lack safely managed sanitation.
- ❖ Till 2015, 663 million do not have access to improved water sources.
- ❖ Every day, over 800 children die from preventable diseases caused by poor water, and a lack of sanitation and hygiene.

<https://www.unicef.org/wash/>

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WASH: National Scenario

Region	2010		2012					Mid 2014	
	Water	Sanitation	Total	Water		Sanitation		Water	Sanitation
	%	%	HHs	HHs	%	HH	%	%	%
EDR	76.4	42.2	1,142,476	885,902	77.5	560,752	49.1	82.45	62.58
CDR	81.3	46.1	1,723,142	1,340,244	77.8	894,612	51.9	85.21	62.77
WDR	84.6	53.5	900,637	791,925	87.9	623,169	69.2	82.84	80.6
MWDR	76.3	30.7	638,510	491,595	77.0	341,692	53.5	80.92	86.29
FWDR	83.32	29.1	43,2659	331,282	76.6	170,353	39.4	84.68	78.19

NMIP (2014). Nationwide coverage and functionality status of water supply and sanitation in Nepal. National Management Information Project, Department of water supply and sewerage, Ministry of Urban Development, Government of Nepal. Kathmandu.

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WASH: National Scenario

Region	2010		2012				Mid 2014		
	Water	Sanitation	Total	Water		Sanitation		Water	Sanitation
	%	%	HHs	HHs	%	HH	%	%	%
Ecological zone									
Mountain	77.6	33.6	296,850	221,366	74.6	136,469	46.0	80.19	74.48
Hill	79.9	52.9	2,265,392	1,819,154	80.3	1,450,040	64.0	84.89	87.14
Tarai	81.2	35.6	2,261,182	1,800,428	79.6	1,004,069	44.4	84.79	56.93
Nepal	80.4	43.3	4,823,424	3,840,948	79.6	2,590,578	53.7	83.59	70.28

NMIP (2014). Nationwide coverage and functionality status of water supply and sanitation in Nepal. National Management Information Project, Department of water supply and sewerage, Ministry of Urban Development, Government of Nepal. Kathmandu.

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National Commitments: MDGs

<p>1 ERADICATE EXTREME POVERTY AND HUNGER</p>	<p>2 ACHIEVE UNIVERSAL PRIMARY EDUCATION</p>	<p>3 PROMOTE GENDER EQUALITY AND EMPOWER WOMEN</p>	<p>4 REDUCE CHILD MORTALITY</p>
<p>5 IMPROVE MATERNAL HEALTH</p>	<p>6 COMBAT HIV/AIDS, MALARIA AND OTHER DISEASES</p>	<p>7 ENSURE ENVIRONMENTAL SUSTAINABILITY</p>	<p>8 GLOBAL PARTNERSHIP FOR DEVELOPMENT</p>

Agreed by 189 countries in 2000 (NYC) to be achieved by 2015!

<http://www.betterbytheyear.org>

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Goal 7

Ensure environmental sustainability

Target 7A Integrate principles of sustainable development into country policies and programs and reverse the loss of environmental resources.

Target 7B Reduce biodiversity loss, achieving, by 2010, a significant reduction in the rate of loss.

Target 7C Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation.

Target 7D By 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers.

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Nepal's Progress on WASH (MDG)

Indicators	1990	2014	2015 Target
Proportion of land area covered by forest (%)	37	39.6	40
Proportion of terrestrial area protected (%)	7.4	23.35	--
Area of forest managed by communities (million ha)	0.013	1.798	--
Proportion of population using an improved drinking water source (%)	46	83.6	73
Proportion of population using improved sanitation facility (%)	6	60.1	80
Population living in slums, and squatters		500,000 (2010)	--

Source: NPC (2015). SDGs 2016-2030 National (Preliminary) Report. GoN, NPC, Kathmandu p.12 & References cited therein

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WASH: National Scenario

- ❖ 2015: Basic water supply coverage 87%, Sanitation 82% of the population.
- ❖ Less than half (49.5%) of HHs have access to piped water (varies with social groups and place of residence).
- ❖ 82.2% HHs are using contaminated water (*E. coli*).

NPC (2017). Nepal's SDGs baseline Report 2017. GoN, NPC, Kathmandu.

NPC (2017). Nepal's Sustainable Development Goals- Status and Roadmap: 2016-2030. Government of Nepal, National Planning Commission, Kathmandu.

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WASH: National Scenario



Disease Caused by Drinking Polluted Water



Unfinished targets of MDGs continues as SDGs

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SDG 2016-2030: Targets



SUSTAINABLE DEVELOPMENT GOALS

17 GOALS TO TRANSFORM OUR WORLD



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SDG-6

Ensure availability and sustainable management of water and sanitation for all . The targets for 2030 include:

- (i) **Achieve universal and equitable access to safe and affordable drinking water for all.**
- (ii) **Achieve access to adequate and equitable sanitation and hygiene for all and end open defecation.**
- (iii) **Improve water quality** by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials.

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SDG-6: Targets

- iv. Substantially increase water-use efficiency across all sectors.
- v. Implement integrated water resources management at all levels.
- vi. Protect and restore water-related ecosystems including mountains, forests, wetlands, rivers, aquifers and glacial lakes.



NEPAL

Sustainable Development Goals

Status and Roadmap: 2016-2030



GOVERNMENT OF NEPAL
NATIONAL PLANNING COMMISSION
KATHMANDU



SDG-6: Targets

Targets and Indicators	2015	2019	2022	2025	2030
Target 6.1: By 2030, achieve universal and equitable access to safe and affordable drinking water for all					
6.1.1: HHs with access to piped water supply	49.5	60.3	68.4	76.5	90
6.1.2: Basic water supply coverage (%)	87	90.2	92.6	95	99
6.1.3: HHs with <i>E. coli</i> risk level in HH-water ≥ 1 cfu/100 ml (%)	82.2	60.3	43.8	27.4	0
6.1.4: HHs with <i>E. coli</i> risk level in source-water ≥ 1 cfu/100 ml (%)	71.1	52.1	37.9	23.7	0
6.1.5: Population using safe drinking water (%)	15	35	50	65	90
6.1.6: Turbidity (NTU) (%)	30	23.3	18.3	13.3	5

Source: NPC (2015). SDGs 2016-2030 National (Preliminary) Report. GoN, NPC, Kathmandu p.12 & References cited therein 44



SDG-6: Targets

- ❖ The proposed specific targets for the year 2030 include basic water supply coverage to 99% of HHs.
- ❖ **Piped water supply to at least 90% of HHs.**
- ❖ Improved sanitation to at least 95% of HHs.
- ❖ Other targets include the enabling of 98% of the population to have access to sanitary latrines.

NPC (2017). Nepal's SDGs baseline Report 2017. GoN, NPC, Kathmandu.
 GoN (2017). Nepal's Sustainable Development Goals- Status and Roadmap: 2016-2030. Government of Nepal, National Planning Commission, Kathmandu.



Conclusion

- ❖ Water is a finite resource.
- ❖ It is vulnerable (pollution, climate change)
- ❖ Demand is increasing and source is decreasing.
- ❖ Public health and wellbeing is dependent on quality of water
- ❖ Water stressed/scarced population or area is increasing.
- ❖ We need to opt for water conservation and sustainable use approaches.

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Impact of urbanization in water cycle and sustainable urban water cycle



Source: AUCKLAND CITY COUNCIL (2010)



सुन्नेलाई सुनको माला ।
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