7th IDSAsr

NATIONAL SEMINAR

Recycling Waste Water and Reuse System

Venue
Conference Hall,
Guru Nanak Bhawan
Guru Nanak Dev University
Amritsar-143005

November27-28, 2015

Guru Arjan Dev
Institute of Development Studies

14-Preet Avenue, Majitha Road, PO Naushera, Amritsar-1430008
(Under the aegis of Guru Arjan Dev Institute of Development Studies Society)
Registered under the Societies Registration Act XXI of 1860

Recycling Waste Water AND REUSE SYSTEM

Reclaimed water or recycled water is former wastewater (sewage) that is treated to remove solids and impurities, and used in sustainable landscaping irrigation, to recharge groundwater aquifers, to meet commercial and industrial water needs, and for drinking. The purpose of these processes is sustainability and water conservation, rather than discharging the treated water to surface waters such as rivers and oceans. Recycled water can be used for stream flow augmentation to benefit ecosystems and improve aesthetics. The definition of reclaimed water, as defined by Levine and Asano, is "The end product of wastewater reclamation that meets water quality requirements for biodegradable materials, suspended matter and pathogens. Simply stated, reclaimed water is water that is used more than one time before it passes back into the natural water cycle. Scientifically-proven advances in water technology allow communities to reuse water for many different purposes, including industrial, irrigation and drinking. The water is treated differently depending upon the source and use of the water and how it gets delivered. Cycled repeatedly through the planetary hydrosphere, all water on Earth is recycled water, but the terms "recycled water" or "reclaimed water" typically mean wastewater sent from a home or business through a pipeline system to a treatment facility, where it is treated to a level consistent with its intended use. The water is then routed directly to a recycled water system for uses such as irrigation or industrial cooling.

In spite of quite simple methods that incorporate the principles of water-sensitive urban design (WSUD) for easy recovery of storm water runoff, there remains a common perception that reclaimed water must involve sophisticated and technically complex treatment systems, attempting to recover the most complex and degraded types of sewage. As this effort is supposedly driven by sustainability factors, this type of implementation should inherently be associated with point source solutions, where it is most economical to achieve the expected outcomes. Harvesting of storm water or rainwater can be an extremely simple to comparatively complex, as well as energy and chemical intensive, recovery of more contaminated sewage.

Reclaimed water is highly engineered for safety and reliability so that the quality of reclaimed water is more predictable than many existing surface and groundwater sources. Reclaimed water is considered safe when appropriately used. Reclaimed water planned for use in recharging aquifers or augmenting surface water receives adequate and reliable treatment before mixing with naturally occurring water and undergoing natural restoration processes. Some of this water eventually becomes part of drinking water supplies.

A water quality study published in 2009 compared the water quality differences of reclaimed/recycled water, surface water, and groundwater. Results indicate that reclaimed water, surface water, and groundwater are more similar than dissimilar with regard to constituents. The researchers tested for 244 representative constituents typically found in water. When detected, most constituents were in the parts per billion and parts per trillion ranges. DEET (a bug repellant), and Caffeine were found in all water types and virtually in all samples. Triclosan (in anti-bacterial soap & toothpaste) was found in all water types, but detected in higher levels (parts per trillion) in reclaimed water than in surface or groundwater. Very few hormones/steroids were detected in samples, and when detected were at very low levels. Haloacetic acids (a disinfection by-product) were found in all types of samples, even groundwater. The largest difference between reclaimed water and the other waters appears to be that reclaimed water has been disinfected and thus has disinfection by-products (due to chlorine use).

A 2005 study titled "Irrigation of Parks, Playgrounds, and Schoolyards with Reclaimed Water" found that there had been no incidences of illness or disease from either microbial pathogens or chemicals, and the risks of using reclaimed water for irrigation are not measurably different from irrigation using potable water. Studies by the National Academies of Science, the Monterey Regional Water Pollution Control Agency, and others have found reclaimed water to be safe for agricultural use.

There is debate about possible health and environmental effects. To address these concerns, A Risk Assessment Study of potential health risks of recycled water and comparisons to conventional Pharmaceuticals and Personal Care Product (PPCP) exposures was conducted by the Water Reuse Research Foundation. For each of four scenarios in which people come into contact with recycled water used for irrigation - children on the playground, golfers, and landscape, and agricultural workers - indicate that it could take anywhere from a few years to millions of years of exposure to nonpotable recycled water to reach the same exposure to PPCPs that we get in a single day through routine activities.

Testing Standards

Reclaimed water is not regulated by the Environmental Protection Agency (EPA), but the EPA has developed water reuse guidelines that were most recently updated in 2012. The EPA Guidelines for Water Reuse represents the international standard for best practices in water reuse. The document was developed under a Cooperative Research and Development Agreement between the U.S. Environmental Protection Agency (EPA), the U.S. Agency for International Development (USAID), and the global consultancy CDM Smith. The Guidelines provide a framework for states to develop regulations that incorporate the best practices and address local requirements. Ongoing wastewater research sometimes raise concerns about pathogens in the water. Many pathogens cannot be detected by currently used tests. Recent literature also questions the validity of testing for "indicator organisms" instead of pathogens. Nor do present standards consider interactions of heavy metals and pharmaceuticals which may foster the development of drug resistant pathogens in waters derived from sewage. To address these concerns about the source water, reclaimed water providers use multi-barrier treatment processes and constant monitoring to ensure that reclaimed water is safe and treated properly for the intended end use.

Distribution and Demand

Nonpotable reclaimed water is often distributed with a dual piping network that keeps reclaimed water pipes completely separate from potable water pipes. In the United States and some other countries, nonpotable reclaimed water is distributed in lavender (light purple) pipes to distinguish it from potable water. The use of the color purple for pipes carrying recycled water was pioneered by the Irvine Ranch Water District in Irvine, California. In many cities using reclaimed water, it is now in such demand that consumers are only allowed to use it on assigned days. Some cities that previously offered unlimited reclaimed water at a flat rate are now beginning to charge citizens by the amount they use.

Potable Uses

Some water agencies reuse highly treated effluent from municipal wastewater or resource recovery plants as a reliable, drought proof source of drinking water. By using advanced purification processes, they produce water that meets all applicable drinking water standards. System reliability and frequent monitoring and testing are imperative to them meeting stringent controls. The water needs of a community, water sources, public health regulations, costs, and the types of water infrastructure in place, such as distribution systems, man-made reservoirs, or natural groundwater basins, determine if and how reclaimed water can be part of the drinking water supply. Communities in El Paso, Texas and Orange County, California, for example, reuse water to replenish groundwater basins. Others, such as the Upper Occoquan Service Authority in Virginia, put it into surface water reservoirs. In these instances the reclaimed water is blended with other water supplies and/or sits in storage for a certain amount of time before it is drawn out and gets treated again at a water treatment or distribution system. In some Texas communities, the reused water is put directly into pipelines that go to a water treatment plant or distribution system. And in Singapore the reused water is bottled directly from an advanced water purification facility for educational and celebratory purposes. Though most of the reused water is used for high-tech industry in Singapore, a small amount is returned to reservoirs for drinking water.

A 2012 study conducted by the National Research Council found that the risk of exposure to certain microbial and chemical contaminants from drinking reclaimed water does not appear to be any higher than the risk experienced in at least some current drinking water treatment systems, and may be orders of magnitude lower. This report recommends adjustments to the federal regulatory framework that could enhance public health protection for both planned and unplanned (*or de facto*) reuse and increase public confidence in water reuse.

Modern technologies such as ***reverse osmosis*** and ***ultraviolet*** (RO+UV) disinfection are commonly used when reclaimed water will be mixed with the drinking water supply. An experiment by the University of New South Wales reportedly showed a reverse osmosis system removed ethinylestradiol and paracetamol from the wastewater, even at 1000 times the expected concentration.

Aboard the International Space Station, astronauts have been able to drink recycled urine due to the introduction of the ECLSS system. The system cost $250 million and has been working since May 2009. The system recycles wastewater and urine back into potable water used for drinking, food preparation, and oxygen generation. This cuts back on the need for resupplying the space station so often.

Indirect potable reuse

Some municipalities are using and others are investigating Indirect Potable Reuse (IPR) of reclaimed water. For example, reclaimed water may be pumped into (subsurface recharge) or percolated down to (surface recharge) groundwater aquifers, pumped out, treated again, and finally used as drinking water. This technique may also be referred to as *groundwater recharging*. This includes slow processes of further multiple purification steps via the layers of 8 earth/sand (absorption) and micro flora in the soil (biodegradation).

Direct Potable Reuse

In a Direct Potable Reuse (DPR) scheme, water is put directly into pipelines that go to a water treatment plant or distribution system. Direct potable reuse may occur with or without "engineered storage" such as underground or above ground tanks. Communities in Texas have implemented DPR projects, and the state of California is studying the feasibility of developing DPR regulations.

Unplanned Potable Reuse

Water reuse occurs in various ways throughout the world. It happens daily on rivers and other water bodies everywhere. If you live in a community downstream of another, chances are you are reusing its water and likewise communities downstream of you are most likely reusing your water. Unplanned Indirect Potable Use has existed even before the introduction of reclaimed water. Many cities already use water from rivers that contain effluent discharged from upstream sewage treatment plants. There are many large towns on the River Thames upstream of London (Oxford, Reading, Swindon, Bracknell) that discharge their treated sewage ("non-potable water") into the river, which is used to supply London with water downstream. This phenomenon is also observed in the United States, where the Mississippi River serves as both the destination of sewage treatment plant effluent and the source of potable water. Research conducted in the 1960s by the London Metropolitan Water Board demonstrated that the maximum extent of recycling water is about 11 times before the taste of water induces nausea in sensitive individuals. This is caused by the buildup of inorganic ions such as Cl^-, $SO4^{2-}$, K^+ and Na^+, which are not removed by conventional sewage treatment.

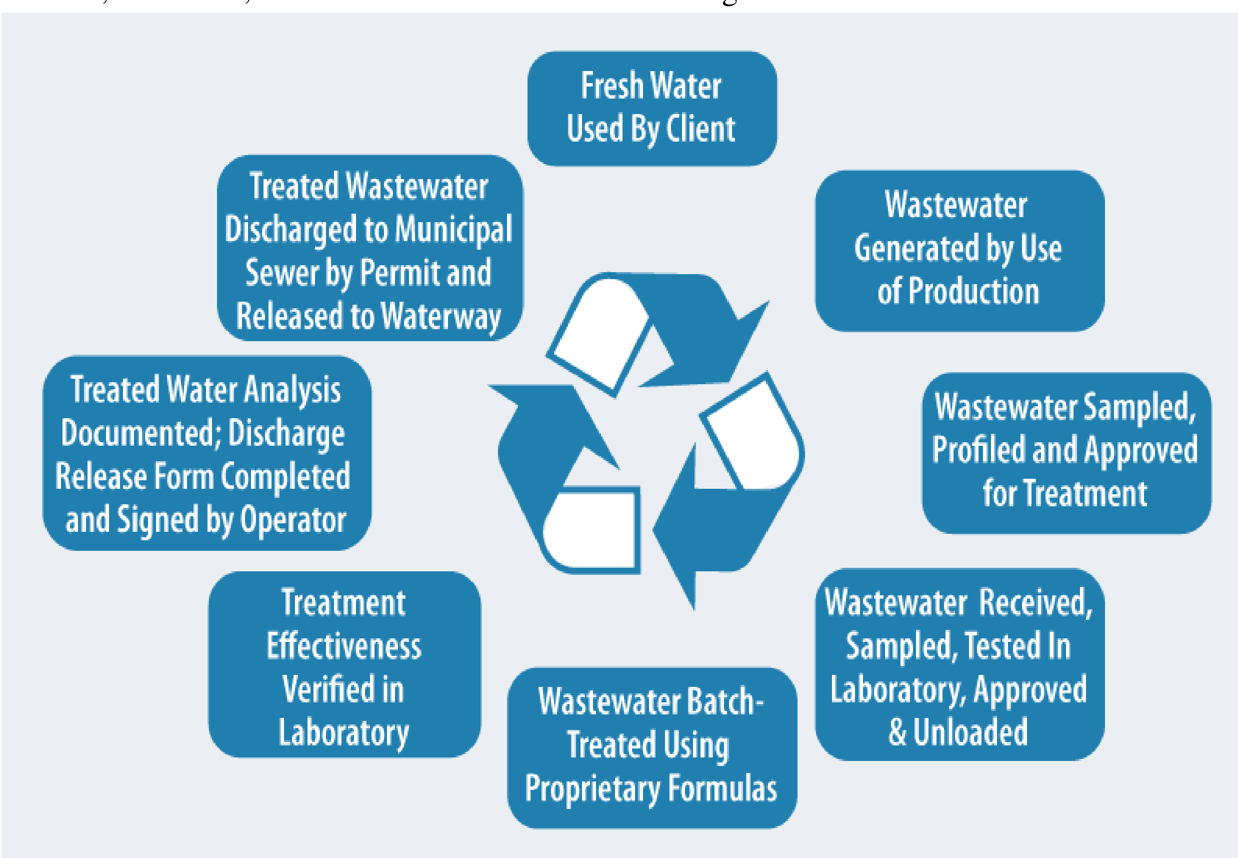
Space Travel

Wastewater reclamation can be especially important in relation to human spaceflight. In 1998, NASA announced it had built a human waste reclamation bioreactor designed for use in the International Space Station and a manned Mars mission. Human urine and feces are input into one end of the reactor and pure oxygen, pure water, and compost (humanure) are output from the other end. The soil could be used for growing vegetables, and the bioreactor also produces electricity.

Treatment Improvements

As world populations require both more clean water and better ways to dispose of wastewater, the demand for water reclamation will increase. Future success in water reuse will depend on whether this can be done without adverse effects on human health and the environment.

In the United States, reclaimed waste water is generally treated to secondary level when used for irrigation, but there are questions about the adequacy of that treatment. Some leading scientists in the main water society, AWWA, have long believed that secondary treatment is insufficient to protect people against pathogens, and recommend adding at least membrane filtration, reverse osmosis, ozonation, or other advanced treatments for irrigation water.



Recent Advances in Reverse Osmosis have been in different countries, but have consistently produced very high quality water all the same. In Singapore, reclaimed water, also known as NEWater has become cleaner than the Government issue tap water. Also, according to Bartels, the Bedok Demonstration Plant, which uses RO membranes, has successfully run for the past 3 years, producing high quality wastewater all the while.

Seepage of nitrogen and phosphorus into ground and surface water is also becoming a serious problem, and will probably lead to at least tertiary treatment of reclaimed water to remove nutrients in the future. Even using secondary treatment, water quality can be improved. Water quality can also be improved as it passes through the subsurface mixing zone where surface water and groundwater combine. Testing for pathogens using Polymerase Chain Reaction (PCR) instead of older culturing techniques, and changing the discredited fecal coloform "indicator organism" standard would be improvements.

In a large study treatment plants showed that they could significantly reduce the numbers of parasites in effluent, just by making adjustments to the currently used process. But, even using the best of current technology, risk of spreading drug resistance in the environment through wastewater effluent, would remain.

Some scientists have suggested that there need to be basic changes in treatment, such as using bacteria to degrade waste based on nitrogen (urine) and not just carbonaceous (fecal) waste, saying that this would greatly improve effectiveness of treatment. Currently designed plants do not deal well with contaminants in solution (e.g. pharmaceuticals). "Dewatering" solids is a major problem. Some wastes could be disposed of without mixing them with water to begin with. In an interesting innovation, solids (sludge) could be removed before entering digesters and burned into a gas that could be used to run engines.

Emerging disinfection technologies include ultrasound, pulse arc electro hydraulic discharge, and bank filtration. Another issue is concern about weakened mandates for pretreatment of industrial wastes before they are made part of the municipal waste stream. Some also believe that hospitals should treat their own wastes. The safety of drinking reclaimed water which has been given advanced treatment and blended with other waters, remains controversial.

Other Alternatives

In urban areas where climate change has threatened long-term water security and reduced rainfall over catchment areas, using reclaimed water for indirect potable use may be superior to other water supply augmentation methods. One other commonly used option is seawater desalination. Recycling wastewater and desalinating seawater may have many of the same disadvantages, including high costs of water treatment, infrastructure construction, transportation, and waste disposal problems. Although the best option varies from region to region, desalination is often superior economically, as reclaimed water usually requires a dual piping network, often with additional storage tanks, when used for nonpotable use.

A less elaborate alternative to reclaimed water is a Greywater system. Greywater is wastewater that has been used in sinks, baths, showers, or washing machines, but does not contain sewage (see black water) and has not been treated at the same levels as recycled water. In a home system, treated or untreated Greywater may be used to flush toilets or for irrigation. Some systems now exist which directly use Greywater from a sink to flush a toilet.

Perhaps the simplest option is a rainwater harvesting system. Although there are concerns about the quality of rainwater in urban areas, due to air pollution and acid rain, many systems exist now to use untreated rainwater for nonpotable uses or treated rainwater for direct potable use. Urban design systems which incorporate rainwater harvesting and reduce runoff are known as Water Sensitive Urban Design (WSUD) in Australia, Low Impact Development (LID) in the United States and Sustainable urban drainage systems (SUDS) in the United Kingdom. There are also concerns about rainwater harvesting systems reducing the amount of run-off entering natural bodies of water.

Reusing and recycling alternative water supplies is a key part of reducing the pressure on our water resources and the environment. Helping us adapt to climate change and population growth. When considering alternative water supplies, you should choose the most appropriate water source, taking into account end use, risk, resource and energy requirements. It is better to reduce water use and avoid generating wastewater in the first place, than to have to identify alternative water supplies and reuse options.

Grey Water

Greywater (all non-toilet household wastewater) can be a good water resource during times of drought and water restrictions, but its reuse can carry health and environmental risks.

Treated Sewage

Recycling wastewater can ease the pressure on our water resources and avoid the need to discharge wastewater to the environment. Recycling wastewater can provide water that, with some management controls, is suitable for a wide range of uses including irrigation and toilet flushing.

Industrial Water

Reusing and recycling industrial water can ease the pressure on our water resources and avoid the need to discharge to the sewer and/or environment. With appropriate management, which may include treatment, industrial water can be used for a wide range of purposes including industrial uses (e.g. cooling or material washing) or non-industrial uses (e.g. irrigation or toilet flushing). To reuse industrial water in a safe and sustainable way you should identify, assess and appropriately manage the risks.

Managed Aquifer Recharge (MAR)

In urban areas where there's not enough surface water storage, aquifers can provide a way to store excess water when it becomes available until the time it is needed. Intentionally injecting or depositing water into an aquifer and then extracting the water for use at a later date is known as managed aquifer recharge (MAR). There has been an increasing interest in using MAR as a mechanism to store and later supply an alternative water source for various uses. For example, storm water could be injected into an aquifer and then later reused for watering parks and gardens in drier seasons.

Worldwide Applications and Acceptance

As of 2010, Israel leads the world in the proportion of water it recycles. Israel treats 80per cent of its sewage (400 billion liters a year), and 100per cent of the sewage from the Tel Aviv metropolitan area is treated and reused as irrigation water for agriculture and public works. The remaining sludge is currently pumped into the Mediterranean; however a new bill has passed stating a conversion to treating the sludge to be used as manure. Only 20per cent of the treated water is lost (due to evaporation, leaks, overflows and seeping). The recycled water allows farmers to plan ahead and not be limited by water shortages. There are many levels of treatment, and many different ways of treating the water—which leads to a big difference in the quality of the end product. The best quality of reclaimed sewage water comes from adding a gravitational filtering step, after the chemical and biological cleansing. This method uses small ponds in which the water seeps through the sand into the aquifer in about 400 days, then is pumped out as clear purified water. This is nearly the same process used in the space station water recycling system, which turns urine and feces into purified drinking water, oxygen and manure. To add to the efficiency of the Israeli system - the reclaimed sewage water may be mixed with reclaimed sea water (Plans are in action to increase the desalinization program up to 50per cent of the countries usage by 2013 - 600 billion liters of drinkable sea water a year), along with aquifer water and fresh sweet lake water - monitored by computer to account for the nationwide needs and input. This action reduced the outdated risk of salt and mineral percentages in the water. Plans to implement this overall usage of reclaimed water for drinking are discouraged by the psychological preconception of the public for the quality of reclaimed water, and the fear of its origin. As of today, all the reclaimed sewage water in Israel is used for agricultural and land improvement purposes.

The second largest waste reclamation program in the world is in Spain, where 12 per cent of the nation's waste is treated. The leaders in use of reclaimed water in the U.S. are Florida and California, with Irvine Ranch Water District as one of the leading developers. They were the first district to approve the use of reclaimed water for in-building piping and use in flushing toilets.

In a January 2012 U.S. National Research Council report, a committee of independent experts found that expanding the reuse of municipal wastewater for irrigation, industrial uses, and drinking water augmentation could significantly increase the United States' total available water resources. The committee noted that a portfolio of treatment options is available to mitigate water quality issues in reclaimed water. The report also includes a risk analysis that suggests the risk of exposure to certain microbial and chemical contaminants from drinking reclaimed water is not any higher than the risk from drinking water from current water treatment systems—and in some cases, may be orders of magnitude lower. The report concludes that adjustments to the federal regulatory framework could enhance public health protection and increase public confidence in water reuse. As Australia continues to battle the 7–10-year drought, nationwide, reclaimed effluent is becoming a popular option. Two major capital cities in Australia, Adelaide and Brisbane, have already committed to adding reclaimed effluent to their dwindling dams. Brisbane has been seen as a leader in this trend, and other cities and towns will review the Western Corridor Recycled Water Project once completed. Goulbourn, Canberra, Newcastle, and Regional Victoria, Australia are already considering building a reclaimed effluent process. Europe and the Mediterranean countries are lagging behind California, Japan, and Australia in the extent to which reuse is being taken up. The concept (of reuse) is difficult for the regulators and wider public to understand and accept.

India's Experience:

The optimist might argue that the glass is half full, while the pessimist might think otherwise. However, both arguments lose steam if the glass has contaminated water, the quantity notwithstanding. Even as you read this, millions of litres of wastewater, generated in India's urban and rural areas on a daily basis, are getting dumped in its already polluted water bodies. There is a good chance that this water has already entered or may enter the human chain. What follows are outbreaks of water-borne diseases, contaminated water-related deaths, not to mention environmental damage. While on one hand we aspire to be a superpower, on the other, we are doing little to mitigate our water woes.

Of the sewage generated in India on a daily basis, only 30per cent gets treated. This means 70 per cent of untreated sewage ends up in water bodies that serve as sources of municipal water. No wonder, clean water is fast becoming a scarce resource. If a checklist is to be made of the factors that contribute to a country's progress, efficient water management might feature right on top. Even the government's Twelfth Five-Year Plan (2012-2017) says that an economic growth of 8per cent - 9per cent is only possible if water requirements of the expanding population can be met. Despite this, wastewater management receives scant attention in India. India is beset by so many other problems that water and wastewater management still doesn't seem to feature on its priority list. Besides, the cost of land and cost of construction and maintenance of sewage treatment plants is quite high. As a result, wastewater treatment is often exempt from urban planning. But with freshwater reserves going down by the day, it is imperative for urban and rural areas to place a premium on wastewater treatment. "By 2030, water demand in India will grow to almost 1.5 trillion cubic metres with supply at approximately 740 billion cubic metres. This gap will need to be bridged by several initiatives ranging from National River linking projects, infrastructure rehabilitation, reducing transport losses to wastewater reuse. "Absent or ineffective government policies coupled with inefficient local level implementation have not necessitated industries and municipalities to focus on wastewater reuse," Is better policymaking the need of the hour? Water in India is primarily a state subject. However, these laws are inadequate when it comes to addressing India's water woes. As a result, the Draft National Water Framework Bill, 2013 states that a set of fundamental principles should guide water governance throughout the country irrespective of divergence in approach. However, central government-formulated policy will not just be helpful, but completely necessary to remove the multitude of local/state legislations. National wastewater reuse scheme allows the private sector to directly work under central government schemes, thereby reducing dependence on states which lend uncertainty to projects given the weak financial positions of states and state entities, except some states. Barring government policies, there is a lot of skepticism among people too when it comes to using treated wastewater even for non-potable purposes. This perception of wastewater not being a reusable resource needs to change. While policy making will help, what needs to change is the mindset of people. Do we need more government incentives? The magnitude of wastewater generated in India is so huge (nearly 40,000 million litres of sewage is generated per day) that public investment alone will not help. Private-public partnerships (PPP) are then the way out. To rope in private players, adequate incentives are needed. "By current estimates of experts, India will require an annual budget of USD 6 billion for meeting its water requirements by 2030," says Singh. "The government will not be able to do this herculean task on its own and will require the private sector to chip in as well. The private sector however will require government incentives for active participation." Kolhapur in Maharashtra has the distinction to be the first city to have opted for PPP for sewage treatment. Jamshedpur and Tirupur are other examples where PPP has been implemented. "Incentivising wastewater reuse and penalizing those who don't recycle sewage will have a 50-50 effect. There are regulations related to wastewater, but people find a way to outdo the system. Since we don't have wastewater reuse standards, we follow international ones and that it will help to have localized standards. Do municipalities need to be more responsible? An IDFC report points out that as per Central Pollution Control Board (CPCB) rules, a city or town's municipality or water authority is responsible for collecting and treating 100 per cent of the sewage generated within its jurisdiction. However, since there are not enough sewage collection networks, only a small portion gets treated. This shows that urban infrastructure is in urgent need of upgrade. Since CPCB is not allowed to penalize water authorities that violate norms, most of them are non-compliant. Stricter laws will certainly help to advocate mandatory wastewater reuse for municipalities in a phased and time bound manner." These laws should be created keeping in mind the resources available at the disposal of the municipalities. Act before it's too late Treated wastewater can be used for a number of non-potable purposes by industry as well as households. This not only reduces dependency on freshwater, but also keeps water pollution in check. If sewage treatment is not taken up on a war-footing, freshwater will soon vanish from Earth's surface. If India is to ensure overall progress, it must manage its water resources efficiently and this is only possible if we take wastewater treatment seriously.

Guru Arjan Dev Institute of Development Studies (***IDSAsr***) recognizes a clear need for new approaches to address the various problems in the ***Recycling Waste Water and Reuse System***. In order to develop the integrated solutions; ***IDSAsr National Seminar*** will be organized under the auspices of Guru Arjan Dev Institute of Development Studies. This seminar will put a lens on the problem while focusing on better understanding the concept, problems faced and policy solution. Further, the discussions will focus on identifying enabling conditions which facilitate the efficient water use. We need to know more about what each of us is doing and this RWW-2015 is an excellent platform for experience sharing across the states. These are early days in our effort at developing a workable strategy and much remains to be done. RWW-2015 will be a privileged forum for debating new research streams and challenges and for identifying areas of success and partnership opportunities in the fields of ***Recycling Waste Water and Reuse System***

Venue of the Seminar: *Conference Hall of Guru Nanak Bhawan*
Guru Nanak Dev University, Amritsar-143005

Duration and Dates*: Two days (November 27-28, 2015tentative)*

Last Date to submit the papers: 31st October 2015

Language of the Seminar: *Official language of the seminar will be English*

Organizer of the Seminar*: Guru Arjan Dev Institute of Development Studies*
14-Preet Avenue, Majitha Road, PO Naushera, Amritsar-143008

Accommodation*: Accommodation will be provided to all the registered delegates in various guest houses on share basis for the seminar period. Extended stay in the guest houses can be arranged against advance payment and confirmation. Hotel accommodation can be arranged against advance payment. For further detail contact 7th IDSAsr Seminar Secretariat.*

Sight Seeing: *A visit to world famous* ***Golden Temple*** *will be arranged in the early hours free of cost subject to sufficient number of delegates.*

2. A visit to ***International (Indo - Pak) Wagah Boarder*** *will be arranged against payment if sufficient delegates opt to watch the pomp and pageantry of the* ***Beating Retreat*** *and the* ***Change of Guard*** *within handshaking distance of Indian and Pakistan forces.*

Registration:

All delegates have to register with ***7th IDSAsr Seminar Secretariat*** *to enable us to serve you better. The registration fee details (****excluding travel****) are as follows:*

Category	***Early bird registration on or before 31st October 2015***		***Late registration***	
	Indian (Rs)	*International(US$)*	*Indian (Rs)*	*International(US$)*
Professional delegates	*2000*	*250*	*2500*	*350*
Student delegates	*750*	*100*	*1000*	*150*

** The conference registration fee includes conference kit, lunch, dinner and coffee at the conference venue. Accompanying person will be charged as a delegate. Children below 10 yrs* *will be exempted from delegates' fee.*

Mode of Payment

Please send by post/e-mail duly filled in registration form along with the fee (in cheque/bank demand draft / bank transfer).

Bank transfer (mention RWW-2015 in subject)
Name of the beneficiary: The Director, GAD Institute of Development Studies
Account No. : 11832151020110
IFSC Code: ORBC0101183
Name of the Bank: Oriental Bank of Commerce
Address of the Bank: Diamond Avenue, Majitha Road, Amritsar.

OR

Local cheque/bank draft
Cheque/demand draft in favour of The Director, GAD Institute of Development Studies payable at Amritsar(mention RWW-2015 on the reverse)

Contact

In case of any query regarding registration, you may please contact the

7th IDSAsr Seminar Secretariat,
Guru Arjan Dev Institute of Development Studies
14-Preet Avenue, Majitha Road,
PO Naushera, Amritsar-143008

e-mail:idsasrsectt@yahoo.com; idsasr@gmail.com

Tel: 91-183-2426045

ABOUT AMRITSAR

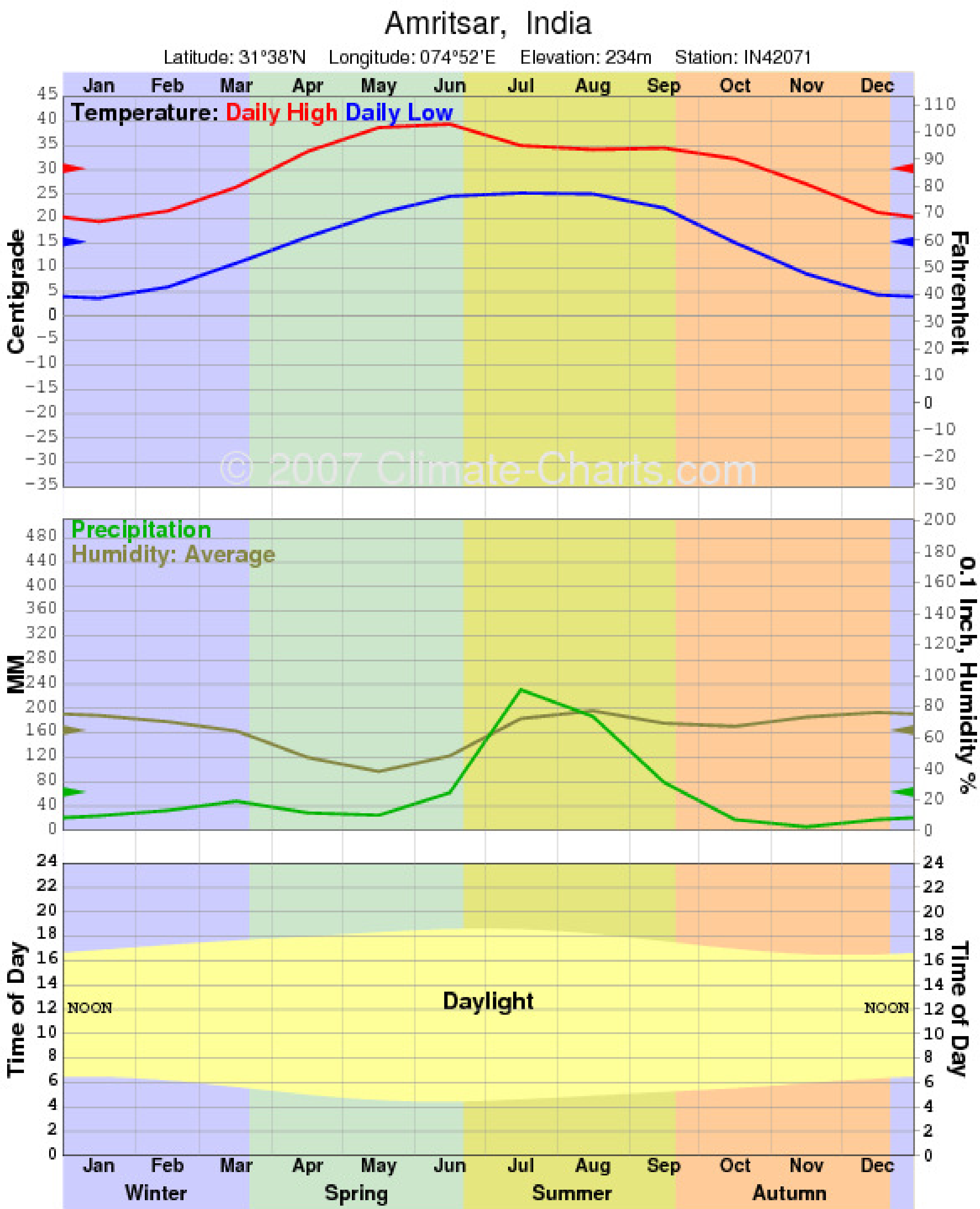
(The City of Golden Temple)

LOCATION

Amritsar city situated in northern Punjab state of northwestern India lies about 15 miles (25 km) east of the border with Pakistan. Amritsar is an important city in Punjab and is a major commercial, cultural, and transportation centre. It is also the centre of Sikhism and the site of the Sikh's principal place of worship.

CLIMATE

Amritsar is located at 31.63°N 74.87°E *with an average elevation of 234 meters (768 ft).Amritsar has a semiarid climate, typical of Northwestern India and experiences four seasons primarily: winter season (November to March) with temperature ranges from 4 °C (39 °F) to about 19 °C (66 °F), summer season (April to June) where temperatures can reach 45 °C (113 °F), monsoon season (July to September) and post-monsoon season (September to November). Annual rainfall is about 681 millimeters (26.8 in).Since 1970, the lowest temperature, −2.6 °C (27 °F), was recorded on 21 Jan 2005 and the highest temperature, 47.7 °C (117.9 °F), was recorded on 21 May 1978.There are on average 3,200 sunshine hours per year in Amritsar.*


Amritsar, India
Latitude: 31°38'N Longitude: 074°52'E Elevation: 234m Station: IN42071
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Temperature: Daily High Daily Low
Centigrade
Fahrenheit
© 2007 Climate-Charts.com
Precipitation
Humidity: Average
MM
0.1 Inch, Humidity %
Time of Day
NOON
Daylight
NOON
Winter Spring Summer Autumn

HOW TO REACH

BY AIR

*Sri Guru Ram Dass International, Amritsar (**Rajasansi**) airport, about 11 km. from town, is connected by domestic flights from Delhi, Srinagar and Chandigarh. You can get to town by a pre-booked rented car, taxis or auto-rickshaws.*

BY TRAIN

Amritsar is connected by direct trains from major Indian cities like Delhi, Jammu, Mumbai, Nagpur, Jaipur, Madras Calcutta and Puri and so on. For more details visit: http://www.indianrail.gov.in

BY ROAD

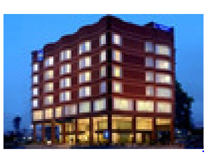
You can drive to Amritsar from neighboring states. Bus services also connect Amritsar with most north Indian towns, including Chandigarh (235 Kms), Delhi (450 Kms), Shimla, Kulu, Manali, Dharamshala and Dalhousie in Himachal Pradesh, Dehradun and Rishikesh in Uttar Pradesh and Jamm; Jaipur Sri Ganganagar in Rajasthan and Sirsa, Hissar in Harayana. There is also a bus service to Lahore, 35 km away, which is the only land route connection between India and Pakistan.

Hotels in Amritsar

Ista Amritsar

Hotel Ista is situated very close to the Golden Temple in Amritsar and is a hotel exuding warmth and class thanks to its staff and modern design and facilities. Hotel

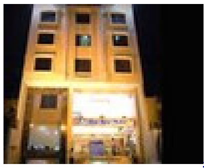
more



Best Western Merrion

Best Western Merrion is located in the up-market region of Ranjit Avenue in Amritsar. The contemporary style and high-quality fixtures and fittings make for a premium experience at one of

more

Aay Kay Hotel ★★★☆☆

Aay Kay Hotel is located on Albert Road, close to the Circuit House in Amritsar. The hotel is in the radius of 2 minutes from Railway Station and Inter State

more

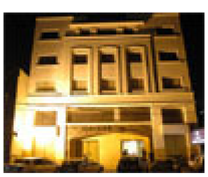
Hotel Airlines ★★☆☆☆

Amritsar forms one part of the Golden Triangle and is a city that has many wonders you can explore, and Airlines Hotel offers the best launching base from which you

★★★Hotel Heritage Inn Amritsar

The Hotel interiors, right from the reception to your room, spin a mystery of its own. All rooms are air-conditioned with 24 hrs. power back up. All the rooms are exceptionally furnished....

View Detail »



★★★Hotel Shiraz Regency Amritsar

Hotel is less than five minutes away from all major Shopping Complexes and corporate towers & is just 8 kilometers from Amritsar Airport and few meters from Railway Station...

View Detail »

★★Hotel Majha Continental

The hotel is ideally located from major tourists attractions and is well known for its warm & friendly service and exceptional Food and Beverage standards...

View Detail »

★★★★Hotel Ritz Plaza

Hotel Ritz Plaza is 1.5 kilometers from Amritsar Railway Station and 11 Kilometers from International Airport. The pride of Punjab and the most holy Sikh shrine is just 10 minutes drive from Hotel Ritz Plaza...

View Detail »

★★★★Hotel Mohan International

Hotel Mohan International is one of the most prominent icon in the historic city of Amritsar. Be it the grandeur accomodation in the posh & stylish rooms or the exquisite multicusine delicacices, at Mohan International Amritsar you savour it all in luxury and comfort...

View Detail »

Hotel Astoria Amritsar

1 Queen's Road,Amritsar

Rating: ★★

.Registration Form

1. Name:

2. Date of Birth:

3. Passport No:

4. Official Address:

Residence Address:

5. Contact No:

Office Residence Mobile

Fax: E mails:

6. Food habits Veg/Non Veg

7. Whether presenting paper or not

Tile of the paper

8. Accommodation required Yes/no

If yes: From Organizers/ Golden Temple Complex/ Your own (Against payment)

9. Audio Visual Aid Required:

*10. Detail of registration fee**

Amount in INR DD No Date Bank

11. Mode of Travel Air/Road/Rail

Arrival Information

Date Time Mode

Departure Information

Date Time Mode

12. Will you join Dinner with us on: November 26, 2015 Yes/no

November 28, 2015 Yes/No

Date Signature

**DD may be drawn in favour o The Director, GAD Institute of Development Studies payable at Amritsar*

Research Advisory Council

Guru Arjan Dev Institute of Development Studies
Amritsar

Dr. Rajinder Singh Bawa*,*
Chairman, RAC
Former Registrar, GND University, ASR
Former President Indian Economic Association
88 Holy City
Amritsar-143 005

Dr. Gurdev S. Khush FRS
Member US National Academy of Sciences
Adjunct Professor
University of California, Davis, CA 95616
Former Head Plant Breeding Genetics and Biotechnology,
IRRI, Philippines

Dr. Pritam Singh Raikhy
Former Professor
Punjab School of Economics
Guru Nanak Dev University
Amritsar-143 005

Dr Amarjit Singh Sethi
Professor
Punjab School of Economics
Guru Nanak Dev University
Amritsar-143 005

Dr. Sukhpal Singh
Centre for Management in Agriculture
Indian Institute of Management
Vastrapur, Ahmedabad

Dr. Archana Sinha
Indian Social Institute
10 Institutional Area
Lodhi Road
New Delhi-110 003

Dr K Sudha Rao
Former Vice Chancellor, KSOU, Mysore; Advisor AICTE, New Delhi;
Former Prof and Head Higher Education, NUEPA, New Delhi
Chief Executive Officer, SDME Society,
T-16, CDE Block, Golden Orchid Apartments,
Kasturba Road,Bangalore - 560 001

Dr. Haneet Gandhi
Central Institute of Education
Department of Education
University of Delhi
Delhi- 110 007

Dr Veena Khanduri
Executive Secretary
India Water Partnership (IWP)
Secretariat- WAPCOS Ltd.
76-C, Sector-18, Institutional Area
Gurgaon - 122015 (Haryana)

Professor Sheikh Md. Monzurul Huq
Department of Geography and Environment
Jahangirnagar University
Savar, Dhaka-1342
Bangladesh

Dr Harbans Singh Aulakh
Principal Economic Adviser
Energy Efficiency and Conservation Authority
Government of New Zealand
Wellington, New Zealand

Dr Termit Kaur Ranjit Singh
Senior Lecturer,
Lead Trainer, ICT in Education Resource Distribution Center, UNESCO Bangkok
School of Educational Studies, Universiti Sains Malaysia
11800 Penang.

Prof. Dr. Kausar Jamal Cheema
Dean Faculty of Natural Sciences
Head of Environmental Science and Zoology Departments
Lahore College for Women University,
Jail Road, Lahore. Pakistan

Dr Ravinderpal Singh Malik
International Water Management Institute
DPS Marg, NSCA Complex
New Delhi

Dr Rampartap Singh
Former Vice Chancellor
Maharana Partap University of Agriculture and Technology
Partap Kuteer
B-5/5,Vinay Khand,Gomti Nagar
Lucknow

Dr R P Singh
Director
Amity Business School
Lucknow

Dr Gursharan Singh Kainth
Director–cum-Member Secretary
Guru Arjan Dev Institute of Development Studies
Amritsar

SEMINARS:

IDSAsr has organized since its inception following six national/international seminars, that is, since July 2009.

1. *1st National Seminar on* ***Food Security and Sustainability in India*** during November 2009

2. *2nd National Seminar on* ***Management of Natural Resources and Environment in India*** during October 2010

3. 3rd International seminar on ***Water Security and Climate Change: Challenges and Strategies*** during November 2011

4. *4th IDSAsr International seminar on* **The Water Energy and Food Security** *during February, 2013.*

5. 5th IDSAsr International seminar on **Right to Education: Roadmap Ahead during** *March, 2013.*

6. 6th IDSAsr International seminar organized on ***Energy for Sustainable Development in Asia Pacific*** *with effect from November29 to December 01, 2013*