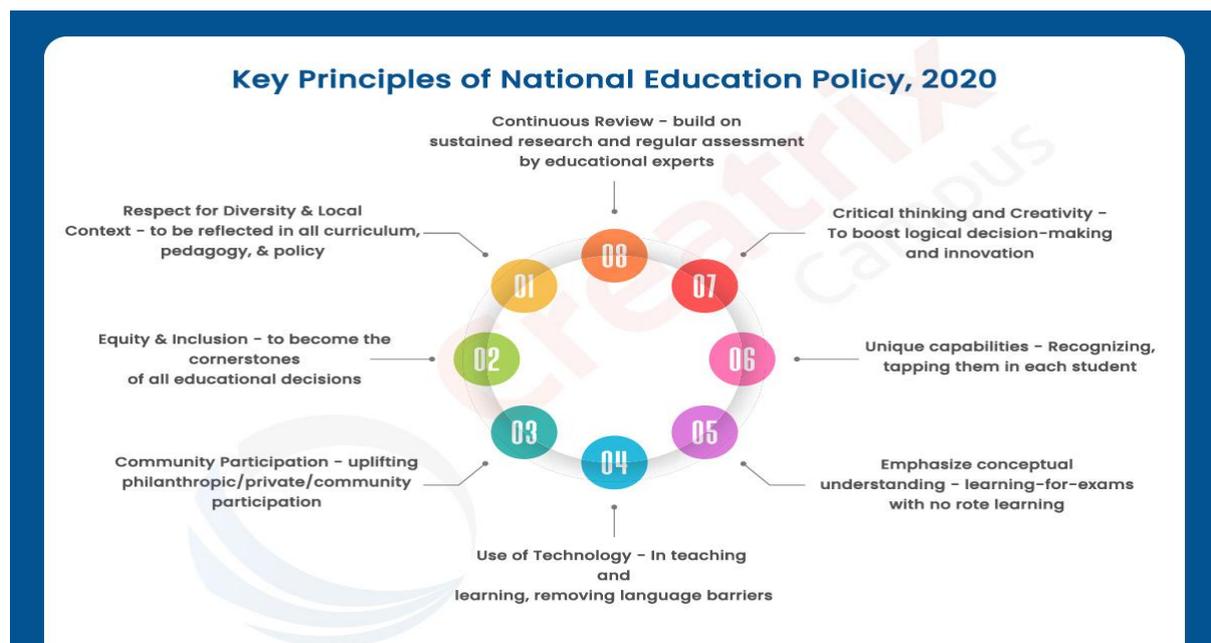


Proposal for **Water & Wastewater Management for River Rejuvenation & public health-sanitation** UG/PG curriculum to be introduced by Gujarat Technical University, in alignment with NEP 2020 and mitigate climate change issues and global crisis of water scarcity.

Preamble

Education system is a backbone of any country and the knowledge system grooms the character of a person. Through education transaction connecting pupils with the societal issues is important to sensitize and make them sensible. Water, a precious natural resource, vital for life, has become polluted and intensifying as a point of conflict in human society, at national and international level due to its scarcity. One of the major option to resolve the crisis is through educating the people to be citizens responsible for sensible use of water.

Although it is known to all that Fresh water resources form a lifeline for all organisms including human populations. Over evolutionary periods of time, human settlements have developed on the river banks. However, with the increasing global industrialization, urbanization and commercialization and materialistic world, rivers have become a water body used for dumping garbage, releasing domestic and industrial effluents and are emaciated and polluted. Today across India, all major rivers, and their tributaries are in a deteriorated condition. **If water is there life will exist and education will be meaningful.** The corrective actions need to be adopted with a sense of mission with involvement of all the stakeholders. Similarly, each river needs to be considered as a part of the ecosystem and the measures of rejuvenation of the rives need to be considered with a holistic approach to restore the ecosystem to its pristine level. Constant occurrence of erratic rains, droughts and floods and water scarcity crisis has aggravated with unmindful infrastructure development and growth process.



It is important that Education priorities be recognized with pressing issues. In the year 2015, leaders from 193 countries of the world came together to face the future. And what they saw was daunting. Famines. Drought. Wars. Plagues. Poverty. Not just in some faraway place, but in their own cities and towns and villages. They also knew that billions of people worldwide shared their hope for a better future. So, the leaders from these countries created a plan called the Sustainable Development Goals (SDGs). Set of 17 goals imagines a future just 15 years off that would be rid of poverty and hunger, and safe from the worst effects of climate change. It's an ambitious plan. Each of the 17 goals focuses action and reporting on a factor essential for sustainable developmental goals

SDG 6: ENSURE AVAILABILITY AND SUSTAINABLE MANAGEMENT OF WATER AND SANITATION FOR ALL, followed by a brief narrative: Everyone on earth should have access to safe and affordable drinking water. That's the goal for 2030. While many people take clean drinking water and sanitation for granted, many others don't. Water scarcity affects more than 40 percent of people around the world, and that number is projected to go even higher as a result of climate change. If we continue the path we're on, by 2050 at least one in four people are likely to be affected by recurring water shortages. But we can take a new path—more international cooperation, protecting wetlands and rivers, sharing water-treatment technologies—that leads to accomplishing this Goal.

SDG13: Take urgent action to combat climate and its impacts

To hold warming to below 1.5oC and avoid the worst impacts of climate change, science demands that greenhouse gas emissions must urgently peak, and reduce down to zero by 2050. Improving corporate awareness by measuring and disclosing environmental impact is essential to the management of carbon and climate risk.

SDG15: Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss

Forests are crucial to global sustainable development, affecting both the natural environment and economic prosperity. They are home to 80% of the world terrestrial specific, provide clean water, prevent soil erosion and flood, and can provide one third of carbon mitigation efforts needs to hold temperature rise below 2oC. Some 1.6 billion people depend on forests for sustenance, fuel and medicinal plants, while 10 million people are employed in the forestry sector worldwide.

UN World Water Development Report 2020 'Water and Climate Change' 21 March, 2020 stresses Water resources an essential part of the solution to climate change.

Climate change will affect the availability, quality and quantity of water needed for basic human needs. Deterioration of the situation would hinder achievement of Sustainable Development Goal 6 and will be a challenge for the 2030 Agenda. Currently, 2.2 billion people globally do not have access to safely managed drinking water, and 4.2 billion, or 55% of the world's population, are without safely managed sanitation.

Water use has increased six fold over the past century and is rising by about 1% a year. However, it is estimated that climate change, along with the increasing frequency and

intensity of extreme events – storms, floods and droughts, will aggravate the situation in countries already currently experiencing ‘water stress’

The Director-General of UNESCO, Audrey Azoulay, stresses “that water does not need to be a problem – it can be part of the solution. Water can support efforts to both mitigate and adapt to climate change.”

In UN 2023 Water Conference which took place from 22-24 March 2023 at the United Nations in New York City generated 700 commitments aimed at driving transformation towards a water-secure world. This conference brought together world leaders, business people, scientists, academics and others from across many sectors around a common goal to get the world on track to meet Sustainable Development Goal 6 (water and sanitation for all by 2030) and progress across all SDGs.

In Water management 2021 report by NITI Ayog acknowledged immense importance of water for sustenance of life on the planet (health, food security and livelihood). The report further mentioned that 40% of the population of India will have no access to water and sanitation by 2030. NITI Ayog Composite Water Management Index states that India is suffering from worst crisis of water in its history and millions of lives and livelihood under threat. The emphasis is on sustainable mindset to become aware of the long-term impact that short term choices have on environment.

In ancient time water management was effective as it was considered common property resources maintained managed shared and respected by the people, this perspective has unfortunately faded away. India was once upon a time knowledge leader of the world, as in our rituals, traditions and practices we showed the world how to respect the nature as we respected her as Mother Nature and worshiped rivers, trees, animals, stones as God.

Rivers system of India play an important role in the lives of people. River systems provide irrigation, portable water, transportation, electricity as well as provide livelihoods for a large number of people all over the country. Rivers also have an important role in Hindu mythology and are considered holy by all the people. Besides this, river system contributes largely to the ecology and environment with its numerous functions. It helps number of aquatic species to live in river. Rivers are important for the economy of the country because the river water is a fundamental natural resource necessary for different human activities. River is a gift of nature, not just flowing water. Hence there are number of views on, free flow, environmental flow, ecological and economic flow of river. River has many other functions, not only flowing water, carrying huge stones, sand formation, land creation - char, increasing fertility of land, irrigation to cultivable land, maintain river bed water sources - chuan, maintains soil moisture, nurtures and contributes in the form of tributaries.

Despite of so much importance of water and rivers, rarely any topic is in syllabus existing in any University where basic fundamentals and science of these entities are taught, as evident from serious pollution of Ganga and all most all the rivers. It is pertinent from the rising number of NGT & SC cases and climate change consequences that education system must act with priority, and create mass education regarding the water crisis, repercussions of polluting and diminishing rivers, for atmosphere building, capacity building, and understanding science

and principles along with bringing behavioral changes, with sense of science and wisdom. With this goal, curriculum is proposed for an undergraduate program to create not only responsible citizens but to create workforce to mitigate conflicts, research new technologies towards sustainable use of water at all socio-economic and industrial levels and create societies free of water-stress. Keeping in view the global crisis of water security, dying rivers and adversities of climate change, the New Education Policy 2020 recommendations is providing scope for students' holistic development through community engagements. Hence through this proposal we wish to introduce "Water Management and River rejuvenation" curriculum framework.

Proposed Curriculum: 1- Water & Wastewater Management (UG to PG) for water security & 2- River rejuvenation & Water management (UG) for public Health and sanitation

The curriculum is designed in tune with the national Education Policy providing liberal education, across all disciplines, with multiple useful exit and entry points, creating trained human resource to face local or global water-crisis with a multidimensional solution oriented approach. The graduates will in addition be able to teach and coach citizens to use water wisely, in whichever vocation they opt for livelihood. *Multidisciplinary foundation courses may be developed based on this prototype of curriculum.*

The concept is to design a flexible curriculum which can be adopted by any institution of higher education and molded to create a force of various cadres as per the requirement and demand in the society to manage water as a natural resource. A learner of any faculty can opt for modules in this curriculum to get certificate, diploma and advanced diploma and a Degree due to multiple entry points and exits, with a multidisciplinary dimensions of the curriculum.

Pedagogy: Offering application based experiential Learning through theory and practicals, community handholding, local body/Industry collaborations, Case studies, field work, and a mandatory live-project.

Evaluation Pattern: Formative and Summative Assessment. Passing Standard as per the UGC norms and of the particular University offering the Course, and may be at the discretion of the affiliating University/ autonomous institution. And as per the guidelines of NEP 2020.

Mode of implementation: Certificate (6-8months), Diploma (12-15 months), Advanced Diploma (18-20 months) UG Degree (Six Semesters) & PG (Four Semesters)

Eligibility for Admission: Candidate who has passed XII standard or equivalent examination from any stream. Further Growth/Employability: Student with Bachelor's degree in this program will be eligible for any PG program in allied field. Consultancy for environmental assessment & Employment opportunities in any government, semi-government body dealing with water management, land revenue, forest, biodiversity, public health, leading to increase in knowledge wealth of the country and economic growth.