Education and Skills Development in the Wastewater Sector

Gagan Aggarwal[1], Grant Murphy P.Eng.[2]
[1]*Director, India Water Initiatives at Fleming College (Canada)*

I. INTRODUCTION

An opportunity exists in India to offer a comprehensive applied learning program portfolio to a new and substantial market of secondary level students, university students, and existing workers in India's water sector. There are some immediate issues in India that support evaluating this opportunity:

- India's water economy is growing at an annual rate of 18 percent and services in the sector are worth Rs 60,000 crore (C$11.7B) per annum [1].
- India's education level needs to be increased in order the meet the country's significant skill needs in the water sector.
- Up to 1 million jobs will be created in Water sector in next 3 years (40% of this will be for rural India).
- Lack of properly trained and experienced Civil Engineers in India.
- Most water departments are under staffed.
- Training in emerging themes (viz. water resources management, water allocation and water demand management), which have strong ecological, economic, and social focus.
- India is seeing increased demand for resources such as engineering and frontline staff with additional skills and capabilities in water quality management and treatment [1]
- Existing technical vocational education and training (TVET) is often not up to the required standard, leading to low employability of graduates [1]
- Inadequate training of Indian TVET teachers is a significant barrier to meeting the demand for skilled professionals.
- People with informally-acquired skills face challenges moving into formal programs, as there are limited mechanisms for recognising knowledge and skills obtained outside formal institutional settings.

II. NEED OF THE HOUR

There are many training institutions in India catering to the needs of the country's water agencies such as irrigation department, water supply department, ground water planning & evaluation agencies, and water and land management institutions. But, these institutions are equipped only to deal with the issue concerning development of water resources.

For instance, groundwater prospecting, geo-hydrological surveys, drilling technologies, and water level and quality monitoring are some of the areas on which these agencies undertake training. Hence, they have largely a technical orientation.

Capacity building of primary stakeholders can be achieved through skill based hands-on training. But, the issue is one of creating adequate number of institutions, which are capable of handling this unique task. Whether civil society institutions can handle these tasks needs to be reviewed, as it is uncertain if they can be properly equipped with adequate resources and skills. Further shortage of essential field equipment for monitoring/extension activities along with lack of funds at the operational level put constraints on carrying out essential capacity building interventions.

Students having obtained their 10th level or higher could obtain supplementary vocational training (over and above the in-class learning modules) in areas such as basic water treatment, water quality testing, welding, plumbing, or machining, all-important skills to properly maintain and operate water facilities. Developing water sector training with an applied skills focus in the form of a finishing school model is the need of the hour today -- common in other industry sectors across India. To support water sector training, new facilities will have to be designed and built to accommodate students in order to provide hands-on experience and knowledge transfer.

Through partnerships between skilled trainers and water industry leaders, the finishing school can provide real-world expertise and teach and train students from regional secondary schools and regional industry.

In order to address these significant training and education challenges, the National Skill Development Corporation (NSDC) is actively facilitating skills development and upgrading for the growing Indian workforce through skill training programs. A large part of the organisation's efforts are directed at the private sector and developing skills in India's unorganised sector.

In July 2015, Prime Minister Modi announced the Industrial Training Institute (ITI) Initiative, which provides a dedicated focus on linking industry and apprenticeships. It is can also be offered in conjunction with Industry partner(s) to create employment-oriented programs for ITI graduates in collaboration with Centre.

III. OVERCOMING THE CHALLENGES

To overcome these challenges, Fleming College offers a comprehensive applied learning program portfolio to a new

and substantial market of secondary level students, university students, and existing workers in India's water sector. . Fleming College will respond to the need to develop knowledge and competency of water sector workers, including drainage inspectors, water engineers, plumbers, treatment plant operators, supervisors, and others. Fleming College aims to develop, promote, and deliver training and education in order to offer a multi-faceted approach that addresses major water sector skill gaps within India.

There is an opportunity to developing the knowledge and competency of frontline or "grassroots" workers through affordable and effective water sector training courses delivered in a finishing school. Through our partnerships in India, the Canadian colleges have become aware of significant gaps in available trained workers in many sectors, including the water and wastewater sector. There is a projected need for many thousands of skilled workers to support and maintain an increasing number of treatment facilities.

Theory-based certification affects employability—the current certification process is based largely on theoretical testing, instead of an actual grasp and display of skills. As a result, sometimes even the certified workers lack the skills to be employable, and are rejected in the workplace. A finishing school will be developed and modelled after the Kawartha Trades and Technology Centre (KTTC) at Fleming College where skilled trainers and facilitators provide real-world expertise, in an effective and interactive learning environment.

University level engineering students can develop additional hands-on applied education prior to graduation in order to improve the water sector resource base. This applied training curriculum is widely recognized by the Canadian industry and ensures a job ready water sector workforce, developing specialised career options including water plant managers; design specialists; laboratory technicians, policy specialists; and water resource modellers, as examples. Ongoing training and education is important so that water sector workers have up-to-date knowledge so there needs to be advanced educational opportunities to current and up-and-coming managers in the water sector to improve their knowledge and awareness related to new water technology, science, or engineering—focusing on efficient operational techniques and treatment technology advances.

There is a need for a robust "train-the-trainer" (TTT) program to develop capacity in the water skills sector—creating a larger pool of competent instructors who can then teach the material to other people—reinforced by principles of continual quality improvement and education professional ethics. Providing more proficient water sector trainers addresses the needs of many thousands of skilled workers to support and maintain an increasing number of treatment facilities. Mobile technology and related applications will be used for continuous training of trainers.

IV. EXPERTISE AND EXPERIENCE

Fleming College has expertise in developing and delivering environmental programs and provincially mandated instruction for drinking water operators in the province of Ontario. Fleming College provides curriculum, training coordination, and custom course delivery in wastewater and water operations.

Canada's leading school for careers in environmental and natural resource sciences with 40+ years of experience. Fleming has expertise in water – programs, research, and training. With over 2000 full time students in the School of Environmental and Natural Resource Sciences (6000+ full time, and another 10,000 part-time at Fleming College) our environmental programs draw from across the country and around the world: +75% are imports vs. local.

Fleming College offers Ontario College Diploma (OCD), and a limited number of degree programs which are two years, three years, and four years in length. Some courses of study lead to official certifications in skilled trades that are regulated by professional associations.

Advanced Water/Wastewater Operations and Management is offered by the College along with one year certificates; two year diplomas; three year advanced diplomas – e.g. environmental technology; post-graduate certificates; and joint diploma/bachelor degrees. Also offered are shorter duration skilled based programs such as well technician, heavy equipment operator, and geothermal drilling.

The Centre for Alternative Wastewater Treatment (CAWT) is Fleming College's premier research institute and promotes innovative forms of water and wastewater treatment technology through applied research projects, performance measurement and verification, education and training and demonstration projects. Since its construction in 2002, the CAWT has secured over $10M in funding to collaborate with industry and governmental partners to conduct research in the area of alternative forms of water and wastewater treatment. The CAWT currently employs 25 staff, including Research Scientists, Project Managers, Lab Technologists and Technicians.

Knowledge Creation - Main focus on water/wastewater technology advancement and development

R&D and Commercialization; Knowledge & Technology Transfer - Emphasis on rural and underdeveloped communities and on innovative technologies;

Education and Training - Resources, courses, workshops;

Community Development- Local, national, and international capacity development projects

Fostering collaborative research partnerships with industry, universities, government agencies, non-governmental organizations, the CAWT engages in opportunities to enhance student learning through the integration of applied research activities in student curricula. Since opening, the CAWT has secured approximately **$10**

million (CAD) in resources and over **60 industry partnerships** and has expanded applied research activities into many technologies:

- Composting technology
- Gasification technology
- Bioremediation of heavy metals with bacteria
- Well design and installation
- Advanced Oxidation Technologies
- Ultra-filtration Technologies
- Membrane Technologies
- Ultra-Violet Technologies

V. REFERENCES

[1] Kumar, M. D., Bassi, N., Venkatachalam, L., Sivamohan, M. V. K., & Niranjan, V. CAPACITY BUILDING IN WATER RESOURCES SECTOR OF INDIA

[2] Downloaded from National Skill Development Corporation (NSDC) website, May 30, 2015