

Name of organization: World Federation of Engineering Organizations

1. Action/practice/project undertaken (not to exceed 40% of the entire textual input)

Infrastructure Risk Assessment Case Studies

Since 2005, Engineers Canada has been leading a project in Canada to complete a national engineering vulnerability assessment of existing and planned public infrastructure to the impacts of a changing climate. A formalized risk assessment tool, now referred to as the Engineers Canada Infrastructure Climate Risk Protocol (“the Protocol”), was developed and successfully tested in ten case studies, three of which were completed in the reporting period.

Three new case studies were completed in the reporting period including:

1. Metro Vancouver – Fraser Sewerage area stormwater and wastewater collection and treatment system
2. Toronto and Region Conservation Authority – two water control and retention dams
3. British Columbia Ministry of Transportation and Infrastructure – Coquihalla Highway

Training Workshops

In the fall of 2009, Engineers Canada developed a one-day workshop on the principles and applications of infrastructure climate risk assessment. The workshop is oriented towards target audiences that include engineers, planners and managers of civil infrastructure. The workshop includes the theory and principles of risk assessment in the context of climate change. It also introduces the Protocol and its various steps. The workshop includes hands-on exercises where participants in small groups define climate parameters and infrastructure components and climate risks. It includes presentations on case studies that demonstrate the application of the Protocol in the four infrastructure categories.

2. (Interim) Results achieved

Infrastructure Climate Risk Assessment Case Studies

Summary results from the three case studies include:

- The Metro Vancouver Fraser Sewerage Area is primarily a separated sewer system which reduces the impact of severe rainfall events on the collection and treatment system with few, if any overflows anticipated. The dyke system that protects the stormwater and sewage treatment plant has some vulnerability to the combination of high river levels and storm surge, which merits a review of its capability to handle these future possible events.
- For the two dams operated by the Toronto and Region Conservation Authority, it was concluded that both structures are robust enough to be able to withstand the typical climate events that are, and could be experienced in the Toronto area now and in the future.
- There were a number of interactions where the probability of occurrence of the extreme climate event was low but the severity of impact is very high leading to a recommendation to incorporate these scenarios into future operations and maintenance reviews and future upgrades and rehabilitation of the infrastructure.
- The Coquihalla Highway study revealed that the highway is generally resilient to climate change with the exception of drainage infrastructure response to intense rainfall events arising from a meteorological phenomena known as the Pineapple Express. Specifically:
 - Water ponding on roadway surfaces could cause safety hazard for vehicle traffic (i.e. hydroplaning, etc.);
 - Water ponding on roadway surfaces could impede emergency response;
 - Maintenance effects could include increased erosion; and

- Environmental effects of increased erosion include carrying sediments and contaminants to watercourses.

The final reports from these case studies will be available on the website by June 2010. All include executive summaries.

Training Workshops

From November 2009 to April 2010 this workshop was delivered in five locations across Canada to nearly 200 participants. Several more workshops are scheduled in the next few months.

The first international version of the workshop was delivered through the World Federation of Engineering Organizations Committee on Engineering and the Environment to 22 participants from 9 Latin American and South American countries at the international conference "Thinking the Americas", on March 24, 2010 in Recife, Brazil. Several of the participants requested this workshop be held in their country and, subject to available funding, negotiations are underway to confirm dates and locations. The World Federation of Engineering Organizations Committee on Engineering and the Environment will offer this workshop to other World Federation of Engineering Organizations countries in the coming months on a cost recovery basis.

UNFCCC Side Events

A two hour parallel event on climate change mitigation and adaptation of infrastructure was held at the UNFCCC COP-15 meeting in Copenhagen Denmark. The event was organized by the Danish Society of Engineers in partnership with the World Federation of Engineering Organizations Committee on Engineering and the Environment.

A two hour side event on infrastructure climate risk assessment is scheduled at the UNFCCC Climate Talks in Bonn, Germany on June 11, 2010.

3. Challenges

The Protocol is the intellectual property of Engineers Canada. By virtue of its membership in WFEO, there is an opportunity to apply the same methodology for infrastructures located in newly developed and developing countries. The capacity to perform these assessments and to take remedial action does not generally exist; therefore these case studies take the form of knowledge development and capacity building to enable countries to undertake their own assessments in the future.

The long-term goal is to successfully transfer the application of the protocol to newly-developed and developing countries to provide a relatively low cost assessment tool to plan cost-effective adaptation of existing and planned infrastructure to the impacts of future climate change. Adaptation is most effective when it is implemented locally in response to local needs and capabilities. For newly developed and developing countries there must also be a capacity at the country level given the scarcity of human and financial resources.

Another challenge is to secure funding to conduct pilot infrastructure climate risk assessment studies in newly developed and developing countries that would involve knowledge development and capacity building in the country so that it could conduct its own risk assessments.

4. Lessons learned

Risk assessment of civil infrastructure to climate change requires a multi-disciplinary approach. Another important objective is to build capacity of other supporting disciplines and stakeholders including meteorologists, climate change scientists, engineering and

technology professionals as well as management, operations and maintenance personnel administering and operating the infrastructure. As a result these professionals and other personnel are encouraged to attend the training workshops.

5 Emerging needs for further action

New Canadian Case Studies Underway

Several new case studies are underway and will be completed over the next year. The owner and category of infrastructure for these are as follows:

1. Government of Northwest Territories – Rehabilitation of Highway 3 infrastructure
2. District of Shelburne, Nova Scotia – Design of a new sewage treatment plant
3. Ontario Realty Corporation – Three public buildings with different uses in SW Ontario
4. Town of Prescott Ontario – Stormwater management and treatment system
5. City of Toronto, Ontario – Assessment of selected road culvert systems
6. City of Calgary, Alberta – Potable water collection, treatment and distribution system
7. City of Castlegar, BC - Stormwater management and treatment system

The owners of these infrastructures come from different geographic regions in Canada, include small communities and large cities with populations from a few thousand to millions of people and include provincial and municipal levels of government. Other Canadian case studies are in negotiation and will be noted in the next progress report.

International Case Studies

There is an opportunity to develop this capacity and to identify and address infrastructure vulnerabilities through a case study approach that matches Canadian engineers with infrastructure engineers, planners and decision-makers in these countries. The challenge is to identify and secure funding for these projects. Engineers Canada, through the WFEO-CEE has developed a concept proposal to conduct infrastructure climate risk assessment through a knowledge development and capacity building approach that would be applied to newly developed and developing countries.

Our first international case study involves assessing a sewage treatment system in Costa Rica in cooperation with their Colegio of engineers. A knowledge development and capacity building case study proposal has been submitted to the Canadian government for funding support. If approved, the case study will commence in June 2010.

This case study would be followed by similar projects in other developing countries with the long-term goal to standardize the Protocol as an accepted engineering and planning practice for infrastructure climate change vulnerability assessment worldwide. There are tremendous opportunities for international, regional and local cooperation to build local awareness and expertise to adapt infrastructure to climate change impacts in a cost-effective manner that best addresses the engineering vulnerabilities and risks.

More International Training Workshops

The WFEO – CEE, through its chair Engineers Canada, intends to organize more training workshops in Latin American, South American, African and Asian countries. Training materials are now available in English, French and Spanish.

These workshops will be offered on a cost recovery basis, in which costs are normally recovered through registration fees. However, if external funding can be secured from development banks or the country itself then registration fees could be waived or reduced to an affordable level to the participant.