

**ON GUARD FOR HUMANITY**  
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*[BN: I was particularly honoured to address the 617 delegates from around the world as the Conference is held each year in a different Country and here I was in my hometown at the special invitation of the United States Army Corps of Engineers (USACE)]*

Ladies and gentlemen, it gives me great pleasure to address you today on a subject that is close and dear to me, Floods!

But first, a few facts to remember:

1. About 70% of the earth is covered in water;
2. Freshwater lakes and rivers, ice and snow, and underground aquifers hold only 2.5% of the world's water. By comparison, saltwater oceans and seas contain 97.5% of the world's water supply;
3. 68.9% of the earth's fresh water exists in the form of glaciers and permanent snow cover, 30.8% is groundwater, including soil moisture, swamp water and permafrost and only 0.3% of total global freshwater is stored in lakes and rivers;
4. Canada has about 25% of the world's wetlands – the largest wetland area in the world;
5. Wetlands totaling an area of more than 1.2 million square kilometres cover about 14% of the land area of Canada[i].

Of all the forces of nature, no natural disaster causes greater grief, loss of life, untold economic losses and loss of livelihoods than floods.

The most severe flood in Canadian history occurred on October 14 and 15, 1954, when Hurricane Hazel brought 214 millimetres of rain in the Toronto region in just 72 hours. More recently, Manitoba's Red River flood of May 1997 also left its undeniable mark.

If you have experienced a flood first hand, seen its devastating power, and smelt the stench of death and destruction left behind in its path, you'll ask yourself, why?

What appears at first sight to be the elements of a problem rarely are the really important or relevant things – they are at best, symptoms, and often, the most visible symptoms are the least revealing ones.

Floods have been with us since time immemorial and were first recorded in the Bible as a major cataclysm [ii]. Ancient Egyptians, the forefathers of modern engineering and science, looked upon floods as a renewal of agricultural land that enriched soils with much needed nutrients. The resulting rich harvests brought prosperity to the banks of the River Nile.

In Taiwan to this day, typhoons and ensuing floods are regarded as a natural resource; it washes out to sea the accumulation of waste materials littering most of Taiwan's rivers. Perhaps this act may be considered redemption for the sins of rapid development, economic growth and prosperity.

Floods must be allowed to play their rightful role in the cycle of nature; man must learn not to interfere with this process.

Instead, we should collectively try to understand flooding's role and harness its power for the nutrients and minerals needed to sustain life and, of course, the preservation of fresh water, which, after all, is the lexicon of all life on earth.

Dwindling reserves of this precious commodity are fast being depleted by growing populations, development and poor water resources management everywhere. Look at China and India with their explosive economic growth and where their water-table reserves have been reduced to less than 47% off the mark in the last twenty years. Look at countries like Brazil, Indonesia and yes, even Canada and

the USA, where a voracious appetite for lumber is destroying our rain forests and contributing to harmful emissions and global warming.

A visit to Lake Mead in the state of Nevada after seven years of drought coupled with increased demand for water will alarm you. Lake Mead is drying up rapidly and unable to cope with the demand for water; other reservoirs will follow unless action is taken and rapidly.

Man has an incredible ability to conquer the elements and surmount every challenge facing us. But have we gone too far in messing with the forces of nature and their role in the cycle of life?

In the United States, the mighty Mississippi, the Colorado, and Missouri Rivers, in addition to the Great Lakes and the smallest of streams, played a crucial role in the birth, growth and development of that country; no other country on earth has ever experienced the phenomenal growth and prosperity of the United States and it would not have been possible without its majestic waterways.

Growing populations saw more than 80% of their floodplains literally destroyed by these developments; large parcels of agricultural land and open space are being overrun by residential subdivisions, while more and more of the floodplains are given over to the unbridled development of office, commercial and industrial parks. This unchecked growth has contributed to increases in flood damage as rivers, streams and lakes begin to feel the pinch.

The good news is that these trends are being reversed in many parts of the United States; as a result of such policies as “No Adverse Impact,” and the hard work of the the ASFPM[iii] and legislators and programs like FEMA’s[iv] National Flood Insurance Program, damage caused by riverine floods has declined. Combined with the labors of USACE[v], these developments have reduced losses caused by flooding in a number of the riverine floodplains of the U. S. and continue to do so with vigor. Encouragingly, we’ve also seen a move towards pushing construction and development onto higher ground. .

In Canada, we have been lucky; we have land, lots of it, mostly frozen, and therefore, our floodplains are for the most part in the non-populated areas of the country. However, let us not forget that “approximately 60% of Canada’s fresh water drains north while 85% of the population lives within 300

kilometres of the southern border with the United States and the Great Lakes support 33 million people including nine million Canadians and eight of Canada's 20 largest cities, the Great Lakes is home to 90% of Ontario's population and 40% of Canada's economic activity, each year, the Great lakes contribute \$180 billion to Canada-U. S. Trade[vi]."

Is our water table dwindling? Yes it is! It is everyone's duty to ensure that we preserve it for future generations. The Canada-US International Joint Commission on Waterways does magnificent work, but they too need to see action on both sides of the border at the federal level and not political lip service. Governments must act before we wake up one day and find ourselves in the same predicament facing China and India today.

We also have a much smaller population than that of the USA. Nevertheless, we too need to change and not let history repeat itself. In a microcosm, Canada experiences significant flood losses where urbanization has been allowed to develop without clear and concise guidelines as they exist in the USA.

The U. S. population is estimated to double itself in the next twenty or so years. Canada too is growing at a phenomenal rate. Demographics are changing and how we live will change our cities as we know them today; rather than growing outwards, we will most likely grow upwards. The challenge for scientists and hydrologists will be managing water resources, floodplains, run-off from developments on higher ground and their impact on our rivers and flooding.

The costs of these developments will tax everyone and every government and unless we begin to replace outmoded and archaic policies that were fine some one hundred years ago with solutions that are more than just band-aids, we will experience greater and more costly riverine floods and shortages of water.

Look at China and India and their dire water table reserves and don't tell me it won't happen here. We are headed that way and we will get there if change continues to go unattended and relegated to the backburner by other economic or politically expedient considerations.

Another cause for grave concern and one that will surpass that of riverine floods is the impact of climate change and global warming; climate change is no longer a cliché reserved for academics and

environmentalist pundits; it is our reality. You don't have to be a rocket scientist to see the results of these changes throughout Canada, the United States and indeed the world.

Global warming has and will contribute to higher disaster frequencies, be they floods caused by tropical storms, hurricanes, typhoons or cyclones (depending where you are in the globe) and yes(!), even the problem no wants to address: rising sea levels. Cities like Rio de Janeiro, Miami, New York, Halifax, and even Montreal may well be submerged as a result of inaction on the effects of climate change, global warming, emissions and the lack of enforcement and laws to tame industrial pollution.

The luxury of time has long passed; there is not much time left for continued inaction and our tendency to only respond after a catastrophic disaster has occurred must be tempered with preventive action.

In Canada, we are beginning to see with our own eyes large parcels of land collapsing into the oceans, melting ice caps and glaciers and the migration of wild life from their traditional habitats southward and closer to populated areas.

In the Pacific and Indian Oceans, great cities like Sydney in Australia, Tokyo in Japan, Hong Kong and Shanghai in China are all threatened by this new phenomenon that must be put at the forefront of governmental policy.

Islands are collapsing as their coral roots degrade from rising sea levels, the attendant deprivation of the sunlight necessary to give life to their foundations and their very existence. It's happening in the Seychelles, a tourist paradise in the Indian Ocean, in the Vanuatu Islands of the South Pacific and in Alaska, the coastal island of Shishmaref, which has put out a cry for help so that its people may be relocated to higher ground in the mainland before all is lost to the sea.

The costs of these changes will be five to ten times higher in ten years and the time to act is now, not tomorrow. Pragmatic executive decisions must be made by the governments of the day if this process is to be contained and reversed.

Flooding in the underdeveloped and developing world, where I work most of the time, poses even greater concerns than those that we see in developed nations. Most of these countries have

exceptionally high population densities for their geographic size and most lack the means to develop the programs needed to manage their floodplains or water resources.

Floods take their toll in these countries in an unimaginable way; each and every year, hundreds of thousands of people, just like you and me, lose their lives needlessly. The survivors become refugees, their lives burdened with the desperation that accompanies tragedy. The impact upon the global economy cannot be understated.

Today, around 3,800 cubic kilometers of fresh water is withdrawn annually from the world's lakes, rivers and aquifers—a number double the volume extracted 50 years ago[vii].

Notwithstanding the good intentions of developed countries, and the international financial institutions, we see fledgling programs that will go to waste long before they are completed, or will miss their goal of making these communities self-sustainable and productive. Much of these shortcomings can be attributed to gross mismanagement, corruption and greed without any due consideration for or consultation with those most directly affected by these losses.

Budgets, economics, national self-interests and political will all play a role in what gets done and what doesn't. Organizations such as the World Bank and some of the other Development Banks have finally wizedened to the vagaries of corruption and mismanagement. However, these institutions, while recognizing the need for change, are themselves trapped in a web of bureaucracy and long-established policies and unable to accelerate and treat change as a matter of urgency.

Dishing out a fistful of dollars in response to a major disaster after it has happened, sometimes weeks after the event, is a recipe for disaster itself. The need for preventive measures is where we should all be focusing our attention; we must do so with clear and concise objectives, effective technology and a clear strategy to implement programs that can work in a sustainable form at a local community level.

I work with a humanitarian charitable organization dedicated to improving the lives of Canadians and those of the most vulnerable people, especially those exposed to natural and other disasters worldwide and who lack the means to develop emergency preparedness and response programs on their own. We

work with limited resources from donations received from the general public, corporate sponsors and other philanthropic organizations; we must work with what we have and not with what we lack.

This has brought us down to reality in dealing with disaster mitigation and prevention programs and brought us closer to the communities that we serve through a thorough and deep understanding of their needs and past experiences. Disaster Preparedness is less costly and more efficient in reducing the number of deaths, shattered lives, property and economic losses when compared to post-disaster efforts, recovery and reconstruction. We focus our efforts on “one-community-at-a-time” and as a result, develop unique opportunities to make an impact by preparing at-risk people to anticipate and to respond effectively to disasters before they occur. Still, we do more. We attach to these efforts an economic model that fosters social entrepreneurship, thereby ensuring long-term sustainability of our programs and granting everyone in a community vulnerable to disasters, natural and otherwise, an active role in their own programs long before any outside help arrives.

To conclude, let me give you a small example of a community at risk. Year after year, like a Swiss clock, seasonal floods would kill on average of between 800 to 1,000 people over a span of less than 200 kilometres of rivers and their tributaries.

These people were primarily tribal people and made a living fishing, hunting and harvesting their meager crops along these rivers and exchanging the fruit of their labour for much-needed commodities like salt, cooking oil, matches and other necessary items. But when you ask a family why they remain so close to the river when only a year earlier it had lost a son, the year before, a parent and this year, a wife to the floods, the gesture was unsurprisingly familiar. As we had encountered on other continents, these people made a “hand to the mouth” gesture as if to say, “We must feed our families.”

So what did we do? How did we work with people who could not read or write?

We set up a base station in the capital to monitor weather reports, and created a database using data mining and prediction tools. With the help of the tribeswomen and using old World War II solar-powered portable telephones, we eliminated the numbers and replaced them with illustrations of animals that they could identify in a feeding order and asked the tribeswomen to punch in those animals in sequence, which they did dutifully. We explained to them that a magic voice would answer them. We

asked that they repeat this action three times daily, at sunrise, mid-day sun and sunset and report to the voice on the state of a series of river gauges that had been set up every two kilometers along the course of these rivers.

Each gauge had a picture of a plant at the top that each villager could recognize and from which we could establish its location; these gauges in turn had no numeral height measurement indicators, but rather fish well-known in the area. In addition, we gave these women an eye drop tube with three markings—green, yellow and red—so that they could measure the dew collected at sunrise from their vegetable patches.

With their collective feedback, which was transmitted daily without failure, we were able, over a seven-month period, to provide a trend analysis so detailed and exacting that we could predict almost exactly to the hour and location where the river would crest.

This foresight allowed local authorities to move in and evacuate everyone from harm's way before the floods struck; none would lose their parcel of land tenure that they occupied at river's edge.

I am happy to report that in the last six years, no one in the area has lost a life to a flood. This entire exercise cost less than \$235,000 to implement and maintain.

The need to empower people and get them involved in their own flood mitigation programs is pivotal to reducing flood deaths, damage to property and the environment, not only in tribal regions of the world, but in our own highly developed cities. Success cannot consist only of the authority's timely response; it must include programs in which each member of a community works hand-in-hand with the authorities.

Thank you.

[i] *Environment Canada, Quick facts*

[ii] *Old Testament - Genesis 6*

[iii] *ASFPM - Association of State Floodplain Managers*

[iv] *FEMA - Federal Emergency Management Agency*

[v] *USACE - U.S. Army Corps of Engineers*

[vi] *Environment Canada Quick facts*

[vii] *Environment Canada Quick facts*