TURTLE ISLAND INDIGENOUS SCIENCE CONFERENCE 2022

Water is Our Friend:
Flood-Resilient and Climate-Adaptive Housing for Indigenous Communities in Canada

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buoyant foundation project
FLOAT WHEN IT FLOODS
www.buoyantfoundation.org

FLOODING OF LAKE ST. MARTIN, 2011
(IMAGE COURTESY OF CBC)

FLOODING OF PEGUIS FIRST NATION, 2022
(IMAGE COURTESY OF IHEARTRADIO)

Introduction: Canada's colonial legacy has pushed Indigenous communities onto land that is subject to frequent flooding, exacerbated by climate change. Flood risk reduction without displacement is especially crucial for Indigenous populations, connected to their lands culturally, generationally and spiritually.

Research Goals: Our research seeks to integrate Indigenous Traditional Ecological Knowledge (TEK) and Western science in the search for flood-resilient housing. Our cross-cultural and interdisciplinary team focuses on innovative, inexpensive flood risk reduction strategies that are appropriate for individual homes, promoting independence from large-scale government-implemented solutions that may be imposed despite community objections. Our process involves discussion with Indigenous communities inviting them to select solutions for flood-resilient housing that meet their needs and align with their TEK and cultural practices.

FLOODING OF SUMAS PRAIRIE, 2021
(IMAGE COURTESY OF VANCOUVER SUN)

FLOODING OF KINGCOME FIRST NATION, 2017
(IMAGE COURTESY OF EUGENE ISAAC)

Research Methods: This stage of our ongoing research features conversations with members of flood-affected Indigenous communities across Canada. These conversations take multiple forms: talking circles, individual interviews, and, in 2023, a two-day workshop where TEK Keepers and Western-science-trained researchers will collaborate to develop designs for flood-resilient housing for individual Indigenous communities.

Preliminary Results: Our research suggests that each flood-prone Indigenous community in Canada faces a unique flood context and there is no universal solution. Conversations with community members reveal that diking, managed retreat and mounding are seen as appropriate in some communities and undesirable in others. Generally, amphibious retrofitting is viewed positively but interviewees want more information before deciding whether or not it suits their circumstances.

FLOODING OF DENE THA' FIRST NATION, 2022
(IMAGE COURTESY OF GLOBAL NEWS)

FLOODING OF PEGUIS FIRST NATION, 2022
(IMAGE COURTESY OF CTV NEWS)

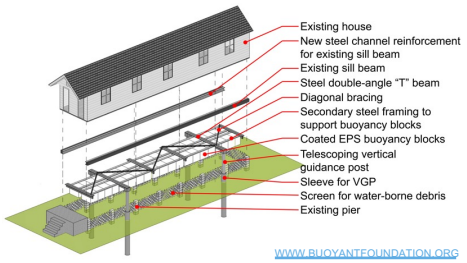
Amphibious housing: Amphibious homes require buoyant foundations and guidance systems that keep homes in place as they rise with the floodwater. Residents of flood-affected areas can modify their existing homes to stay in their communities without fear of devastation and trauma from severe flooding. Amphibious retrofits function in synchrony with natural ecosystems and natural cycles of flooding, allowing water to flow where it will rather than attempting to control it.

Conclusion: Water should be respected as nurturing a land and its people, rather than treated as a hazard to be subjugated. Our research challenges existing Western ways of thinking, to shift flood management practices to a paradigm of acceptance, accommodation, and adaptation to natural events. As climate-change-induced flooding becomes more frequent, we seek the blending of TEK and Western science to find solutions for our most intractable problems. This poster features case studies of inexpensive amphibious prototypes designed for implementation in Canada, the U.S. and Vietnam. See buoyantfoundation.org.

FLOODING OF KASHECHEWAN FIRST NATION, 2006
(IMAGE COURTESY OF TIMMINS DAILY PRESS)

RENDER OF AN AMPHIBIATED NEW ORLEANS SHOTGUN HOUSE

THE BUOYANT FOUNDATION PROJECT (BFP)



EXPLODED AXONOMETRIC

WWW.BUOYANTFOUNDATION.ORG
FLOOD RISK CONF PAPER 2016

FISHING CAMPS

OLD RIVER LANDING, LOUISIANA
Since 1970s (not by BFP)

The water level at Old River Landing (ORL) rises and falls with the seasonal flooding of the Mississippi River. In this remote location, local residents devised an ingenious amphibious foundation system that has helped keep their homes dry for more than forty years. The BFP and ORL amphibiation systems are based on similar principles. Old River is famous for its fishing, watersports and amphibious restaurant. The feasibility of amphibious construction is well demonstrated at ORL.

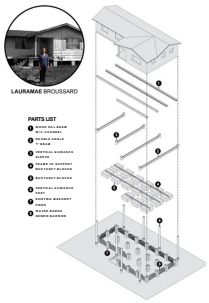
URBAN FLOOD CONF PAPER 2009
ECONOMIC ARGUMENT PAPER 2018

AMPHIBIOUS RESTAURANT WHEN OLD RIVER LANDING IS FLOODED

AMPHIBIOUS HOUSE IN NORMAL CONDITIONS

AMPHIBIOUS HOUSE IN FLOOD CONDITIONS

LAURAMAE BROUSSARD HOUSE, ISLE DE JEAN CHARLES



LAURAMAE BROUSSARD HOUSE RETROFIT AXONOMETRIC

ISLE DE JEAN CHARLES

ISLE DE JEAN CHARLES, LOUISIANA
Project 2016

The Native American Biloxi-Chitimacha-Choctaw Band of Isle de Jean Charles is rapidly losing their low-lying traditional homeland as sea levels rise and land subsides. Facing mass relocation, remaining residents wish to stay as long as possible, and the retrofit of houses in a culturally appropriate manner would bring a sense of normality to a community facing an uncertain future.

LOUISIANA: ISLE DE JEAN CHARLES
THRIVING WITH WATER PAPER 2016

BUOYANT SUBSTRUCTURE

PAVILION AS INSTALLED ON THE UWATERLOO CAMPUS IN 2018

PAVILION IN WINTER

NRC PAVILION PROTOTYPE

WATERLOO, ONTARIO
Constructed 2018

With support from the National Research Council of Canada, the Buoyant Foundation Project constructed an amphibious pavilion prototype for testing the behaviour of buoyancy materials in sub-zero weather conditions. The goals of the project are to develop cost-effective retrofits for flood-prone Indigenous communities facing climate-change-induced flooding and to create guidelines for amphibious construction in Canada.

NRC PAVILION PROJECT
OTTAWA CITIZEN ARTICLE 2019

HERITAGE PROTECTION

PRINCEVILLE, NORTH CAROLINA
Project 2017

The historic town of Princeville sits in the floodplain of the Tar River and has twice in the past twenty-five years been devastated by "100-year" hurricane-related flooding. Buoyant foundation retrofits of Princeville's important landmarks would prevent the forced relocation of this culturally vibrant and historically significant African-American community. The Mt. Zion Primitive Baptist Church, constructed in 1896, is one such landmark in dire need of protection.

HERITAGE PAPER 2019
PRINCEVILLE CHURCH ANIMATION

MT. ZION PRIMITIVE BAPTIST CHURCH, HISTORIC PHOTO

ABRAHAM WOOTEN MEMORIAL

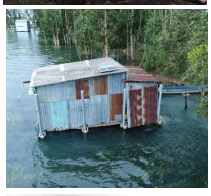
MT. ZION PRIMITIVE BAPTIST CHURCH, 2017 PHOTO

COMMUNITY RESILIENCE

MEKONG DELTA, VIETNAM
Constructed 2018

Rice farmers in the Mekong Delta in Vietnam experience flooding every year, and this seasonal flooding is essential for crop production. But with climate change the floods are increasing in severity. Our project demonstrates a cost-effective alternative to relocation and has developed an easily-reproducible system that, with proper training, the local people would be able to implement on their own using inexpensive, locally-available resources.

VULNERABLE IN VIETNAM VIDEO
DISPLACEMENT & TRAUMA 2019



RETROFITTED HOMES IN THE MEKONG DELTA, VIETNAM