Méadú an taoide
The Growing tide
Clare Reidy
I would just like to take this opportunity to thank firstly and foremost my Mom and Dad without whose constant time, love, advice and funding this thesis would not have been possible. You got me through the year. Secondly I would like to thank Anna Ryan for her thesis support, tireless note taking, great project advice and book loaning and Merritt Bucholz and Peter Carroll for their positivity, creative advice and constant support. Finally I would just like to say a big thank you to my two mentors, Grainne Hassett and Graham Petrie for always steering me in the right direction and being ever helpful, enthusiastic and positive.
Abstract

The aim of this thesis is to re-imagine how to treat the river's edge and introduce new realistic and thoughtful ideas based on different ways of working with water that can help diminish the damage done by the power of water during bad weather conditions and flooding as well as provide new opportunities for engaging with water.

I am working on a scheme based in Limerick City which will strive to forge greater connections between the site and the Shannon River by trying to redefine the practice of building on water allowing for a heightened sensitivity to the flows of the river. It is a project which aims to specifically address the Shannon River’s currents and cycles and will change and transform with every dynamic shift in the tidal water level. The scheme embraces water and tries to enhance the Limerick city's interaction with the famous River Shannon.
Introduction

Ireland, being an island nation, has an inextricably deep rooted relationship with its water edges. Each coastline, sea and river forms an integral part of our heritage and everyday environment. Yet our relationship to the water's edge has often been curious one, changing dramatically throughout the ages but all the time oscillating between joy and fear, between domination and submission. Yet we have always been drawn to the water's edge as it provides a threshold of imagination inviting us into its watery depths. Water's embrace allows us to be freed momentarily from the forces of gravity, allowing for dreamlike feelings of weightlessness and timelessness yet when submerged in its depths one is always aware of the immediacy of mortality.

In her PhD thesis Anna Ryan describes the water's edge and recognizes that it is a place where "a particular intensity is encountered. The physical properties of the edge as a meeting point between both land and water creates a sense of unceasing mobility, nothing is static. The dynamics of light, sound, presence, absence, surface, depth and texture are continually experienced."¹ This meeting of water and land is seen as an eternal rhythmic dance, blurred and indistinct through its continuous movement but always reaching a stable equilibrium.

It is interesting to consider when first we began to think of the meeting point of water and land described by Rachel Carson as the "elusive and indefinable boundary"² as something fixed and static. Perhaps it could be traced back to the drawing of the first boundary lines on a map. These lines between water and land crossed Irish wetlands, bog-lands, rocks, cliffs, beaches etc. The line created a clear and unyielding segregation, a battlefront which sought to remove all haziness in the relationship between land and river. This representation of river's dynamic flowing edge as a dividing line encourages water to be thought of as an inconsequential surface beyond land's edge, a white blank in maps.

Many issues begin to arise if the water's edge which is constantly moving and in a state of flux is considered to be a static entity. These issues are mainly to do with how we divide up terrain and enforce property lines, embankments and other constructions upon the water's edge. This is especially true when considering river and estuary water edges along which in Ireland most of our large cities and towns have historically been built. It explains the shock when during periods of extreme flooding, the water grows beyond our control and refuses to follow our constructed lines. Despite our best efforts and interests to separate land and water, they remain one interconnected organism.

The Shannon Estuary and Limerick City

Limerick City is located on the Shannon estuary right at the interesting point where the fresh-water environments of the river Shannon transition to saline environment of the Shannon estuary. The name Limerick derives from the Irish word "Luimneach" which in turn according to Robert Wyse Jackson is "more than likely a derivative of the old Irish word "Loimenach", or the bare marsh."³ As shown by figure six the Limerick which the first settlers saw was a wide, far spreading tidal marsh "fortified by nature, built upon an island, encircled by a strong Barrier, the arms of the Shannon."⁴

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Figure 1 above: View of Ballybunion coastline, Co. Clare at sunset
Figure 2 below: View of Waves crashing against the Cliff face at Ballybunion, the coastline is never static
Figure 3, 4, 5: Water movement studies completed in Ballybunion
Today Limerick City remains loyal to its deep rooted connection to the River Shannon and is sometimes affectionately referred to as being the “riverside” city. Some people remain aware of the great river Shannon running through their city by the rise and fall of the tide which constantly changes the mood and perception of the area but for the most part the majority of Limerick people live by the river but remain oblivious to its existence until times of extreme flooding occur and the line dividing land and water is broken. During those times the river’s presence cannot be ignored.

Recently, extreme weather events around the world have focussed our minds on the potentially devastating impacts of climate change. The world is warming due to the build up of the greenhouse gases caused by human activity. The sea levels are rising and are predicted to rise by one metre by 2100 due to the thermal expansion of the oceans alone, not considering glaciers and polar ice sheets melting and predicted higher rainfalls resulting in more fluvial flooding. The river’s edge in Limerick city will inevitably begin to push further and further inland with greater and greater force.

Limerick, like many other cities has reconfigured and hardened its water edge in such a way that many water edges are built up to block and separate land from water. There are few opportunities to negotiate a way to the water’s edge. Through the building of quay walls an example of which is seen in figure seven and filling its natural wetlands Limerick has succeeded in drawing a hard line between the water and itself which excludes confrontation and the possibility of new encounters. Yet the building of walls which channel water and barriers to keep out the river Shannon are practices geared toward preventing water from crossing a notional line and are possibly out of place for the Limerick of the future. Such developments are at risk of the water level rising beyond their capacities, the flooding intensifying and the water breaking down these hard boundaries again and again.

The water in “The reflecting pool” of the Washington monument, which connects the obelisk with the Lincoln memorial, has a double function to reflect light and to inspire the people to reflect. Perhaps it is time that we reflect on whether we want to wait until the last minute then desperately build faster and harder to defend ourselves with concrete and steel against the rising water or can we consider an alternative vision. Do we continue with the construction of the battlefront or can a new route be formed that is intrinsically more peaceful and accommodating which sees a gentle re-emergence with the water once again, transforming the hard boundary into a continuum, a smooth transitional zone which respects the inherent mobility of where land meets water. The Shannon estuary in its nature cultivates an appreciation for divergence and an accommodation of ambiguous relationships that provides a good example of the opportunities available to rethink the design possibilities for Limerick city. Limerick has been artful about its coexistence with the water’s edge in the past and has the chance to be creative once again.
This thesis research began with questions about sustainable architecture. At the beginning the resolution appeared to be clear, ‘sustainability’ was a word that made sense in a purely scientific and vernacular way: we are trying to firstly sustain resources and thus human comfort and survival and secondly nature for ethical and aesthetic reasons. Fundamentally we are trying to sustain our environment. However a process of trial and error was applied through the design of short primer projects and the hypothesis was quickly exposed as lacking and restrictive when applied in real terms to the architectural creative process.

The Shannon Airport primer project

Our first primer project was located on the site of Shannon airport in County Clare (figure 8) where the brief was to design a cold storage warehouse. Cold storage developments are lacking within the vicinity and would have great potential to invigorate businesses and job prospects for the region with the provision of this new type of storage facility. Currently there are a large number of pharmaceutical industries in Ireland and thus a growing need to house vaccines and drugs which require cold storage. The focus of this first primer project was to attempt to design a building which was to be sustainable and as eco-friendly as possible. In trying to achieve this, a new design method was devised and applied in which sustainable processes, systems and methods were considered and provided the driving force behind the initial steps of the design.

The project began with a through analysis of the site in order to locate the possible areas of prospective sustainable energy sources. The site was located on the Shannon Estuary and was subjected to tidal differences therefore the first area perceived as a potential energy source was the estuary through which tidal energy could be harnessed. This was followed by an examination of water facilities servicing the airport. It was found that at the location of Shannon airport there had originally been an extensive marshland and in order to combat flooding a widespread drainage system was installed and works continuously to pump water from the landscape directly into the Shannon River on a daily basis. As shown in figure eleven the pumping network was so extensive that the energy required to operate the system in order to simply pump the water from the land to the estuary was shockingly wasteful. Thus it was considered that this water could be used more efficiently as part of the cooling system by redirecting the water into the cold storage unit. The water could be pumped around the building without requiring any further energy than that of the preexisting pumping system.

As part of the brief we had to locate the cold storage unit along the Shannon airport lagoon which had been historically part of a network of landing sites for Flying boats from 1937 to 1945. The lagoon was sheltered by a large pier which reached out towards the deeper waters of the Shannon estuary and was semi circular in plan (figure ten). At the end of the pier an island (figure 9) was ideally located for the cold storage unit between both road access and harbour access. The building warehouse was designed to be as functionally efficient as possible. For this various studies...
were completed different building typologies in order to ensure a smooth process of storing when the product arrived to the warehouse. As there are no other cold storage units housing vaccines in Ireland the design was for a large facility in order to accommodate vast amounts of product.

As shown in figure thirteen the warehouse became a shell like structure into which smaller cold storage "pods" were plugged. These cold storage pods would be the same dimensions of a truck container and could be removed from the warehouse and attached to the truck as required. This was ideal as vaccines are generally small in size and are not usually required in larger quantities than that of a truck container. In this way the cold storage pods could be switched off and on as required and be removed and transported easily. This localized cooling strategy would be much more functionally and energy efficient then that of cooling the entire warehouse space. The rest of the facility accommodated the storing process with high tech machinery proposed to store the product in order to make the facility as functionally and time efficient as possible. The shell like warehouse structure which was freed from internal structure would be flexible to change its function in the future.

As part of the proposal the road leading towards the site would have to be widened to accommodate for the intensification of traffic (figure 12). As this part of this a new widened pedestrian walkway would be incorporated to explore and view the bird conservation zones which were located nearby. This walkway would act as a new recreational resource for Shannon airport and for the people of the Shannon region. The walkway would arrive at the cold storage unit above which there would be new a café giving fantastic views out along the Shannon estuary. This café would be heated from the extracted heat made by the cooling processes being carried out in the warehouse below.

The result of the design process was a building which was sustainable and extremely functionally efficient. It was lacking a greater depth however as in reality it provided little for the wider public to connect to resulting in a building lacking cultural sustainability. The sustainable design method used was flawed and restrictive to the creative process. It resulted in a building design which was unyielding in its pursuit of practicality, functionality and technological efficiency. It led to questions about how the building would be valued in its locale and how sustainable and durable is a building that is not valued.

In “The architecture of happiness” Alain de Botton states that

“any object of design will give off an impression of the psychological and moral attitudes it supports…while buildings keep us warm and help us in mechanical ways, they simultaneously hold out an invitation for us to be specific sorts of people. They speak of visions of happiness.”

The Shannon project while striving with the best intentions to be as sustainable as possible provided no vision for the people.
Figure 13 below: Plan of the proposed warehouse
Figure 14 above: Method map of the various stages to the storing processes carried out
Figure 15 Right: Axonometric of the warehouse
Cultural sustainability

While the results of the efforts of the first primer project were disappointing the conclusions were valuable. The primer project resulted in a new belief being formed that the design process should be free and open and not be driven holistically by eco-friendly parameters. Otherwise it is quite possible to consider the architectural profession becoming redundant to the super computers of the future.

Beyond this the Shannon project provided a critical example of the cultural significance of architecture resulting in the conclusion that architecture cannot be described and designed in a purely scientific way. Alain de Botton alludes to this stating that the importance of architecture goes beyond that of construction techniques and the incorporation of sustainable technologies, stating that

“of almost any building, we ask not only that it do a certain thing but also that it look a certain way, that it contribute to a given mood…we may require it to generate a feeling of reassurance or of excitement, of harmony or of containment.”²

As John Ruskin put it “we want buildings to shelter us. And we want buildings to speak to us.”³ This was not to say that sustainability’s relevance should be diminished within the design process but rather it was realised that architecture could not be generated purely out of sustainability principles. While it is of course important to design buildings which strive to have functional, utility and resource efficiency, to produce a carbon zero building could not be the absolute diving factor to designing good architecture for the future. Architecture should be free to design at will while having this new consciousness which is integral to the design process but does not control it. After all, truly sustainable architecture must be valued within its surroundings and by its occupants if it is to stand the test of time as we are in the end unlikely to respect a structure which does no more than keep us dry and warm.

Architecture has always acted as a psychological determinant of behaviour either consciously or unconsciously. The Panopticon (figure 16) for instance a classic example of how buildings have been designed in the past as a conscious means of systematic control. Through the careful design of the prison plan an infused feeling of constant surveillance was achieved ensuring for the most part good behaviour from the inmates as they felt were under constant watch. Alain de Botton develops this idea further stating

“belief in the significance of architecture is premised on the notion that we are, for better or for worse, different people in different places- and on that conviction that it is architecture's task to render vivid to us who we might ideally be.”⁴

To design in a truly sustainable way we must strive not only to produce architecture with low carbon emissions but to produce designs which are valued beyond statistical eco-friendliness.
Architecture cannot just be sustainable in and of itself; it must be culturally valuable and promote its inhabitants to live more sustainable lifestyles by encouraging a reconnection, an appreciation and an engagement with their natural environment ensuring its protection for future generations. Thus my research began to examine how to incorporate systems into architecture which would encourage more sustainable lifestyles. Architecture can be used as a medium through which a more reasonable relationship with the built and natural environment can be achieved. The materialized culture of today’s societies must adapt and change to become more sensitive to the natural environment to ensure a global future. For every action we do now there are consequences for the future. There is no ‘abstract future’ devoid of relationships to the past. Future impacts are inescapably connected to a manifested sequence of present events.

With regard to the concept of sustainability, the concept of futurity is of fundamental importance. Presently we must look upon the future as being something worth fixing and preparing for in advance to ensure both resource availability and continuity of nature. When we design we must understand and be consciously aware of the ethical rights of humans and non-humans alike to have non-impeded future prospects as a result of our future impacting actions. After all, we would be annoyed beyond reason if we discovered that prior generations had simply extinguished our opportunities for creativity and progress by their simple lack of regard for the future.

The situation we find ourselves in today is a serious one our resources are dwindling and nature is being destroyed at catastrophic levels. A question now being asked is if designers are to blame. According to John Thackara “eighty per cent of the environmental impact of the products and buildings that surround us is determined at the design stage. The ways we have designed the world force most people to waste stupendous quantities of matter and energy in their daily lives.”⁵

A major problem it would seem is architecture and design professions in general have become totally synonymous with business and consumption (figure 17). As Alastair Fuad-Luke put it, “at the centre of this web of desire sits the designer, bringing life to objects the very existence of which has been ordained by business strategists, marketers and economists as ‘demanded’ by the public.”⁶ The interesting aspect about all this production and consumption is that one would think it would make us happier. It has been found that the opposite is true; in fact our increasing reliance on ‘new’ products as a means of expressing our individual progress inevitably ends in disappointment. When discussing consumerism Jonathan Chapman and Nick Gant stated that “desire, consumption, waste, followed by re-desire, makes up an endless sequence of serial dissatisfaction that represents the ecologically inefficient and destructive process through which we fumble today”⁷, thus consumerism is contrary to our comprehension of sufficiency and human happiness.

Figure 17 above: Aerial view of urban sprawl in Limerick City, a product of mass consumerism
An extreme but logical solution to consumerism may be to cease design altogether. This would definitely ensure a minimization of environmental impacts; however, it neglects to regard a crucial fact. At the core of humanity there are deep motivations and desires to create, produce and to consume. This of course is our greatest asset we are by our nature an extremely malleable, flexible and an inventive species but it is also our greatest failing as we destruct our environment on this never ending quest. It is a pointless venture then to try and persuade people to stop consuming as they will not and the architect’s role becomes clearer the moment this inevitable fact is accepted. The aim must be rather, to design an architecture which will channel our inherent creativity towards designing better more environmentally friendly spaces which encourage new behaviour and lifestyles. Architects must become the leading figures in achieving a more reasonable relationship with the physical and natural environment.

A major problem in today’s society is our escalating separation from nature. Nature has become increasingly looked upon as an opposing force, and unruly challenge to the well being of humanity which must be controlled and beaten down, when in reality “we are as dependent today on nature as we have ever been and the illusion we have constructed around ourselves has deceived us into thinking we have conquered it, and become its masters. Yet, beneath the glossy surface of this mirage of progress ecological decay on an unprecedented scale has been steadily gestating”.

It is important that we abandon this concept of man separate from nature as it damages our environment and is thus is a form of self mutilation. More importantly this segregation blinds us to the prospective harmony which can be achieved through design between humanity and nature. Many past masters of architecture understood the true potential of designing with nature with Frank Lloyd Wright saying: “I believe in God, only I spell it Nature.” Humanity and nature are co-tenants on this earth, tied together in continuous evolution and essential partners in survival into the future, “for a real vision of sustainability, architectural design must treat society and the environment as clients too.”

Figure 18 above: Six-year-old Jake Thompson looks at flood waters that have engulfed Alexander Street in Bundaberg on December 31, 2010

Figure 19 below: Lightning streaks across the sky as lava flows from the Icelandic volcano in Eyjafjallajokull, April 17, 2010. It caused enormous disruption to air travel across western and northern Europe over an initial period of six days.
Figure 20 above left: The historical Speicherstadt warehouse district built from 1883 to 1927
Figure 21 below left, 22 above right, 23 below right: Group model work
Figure 24 over: Perspective of proposed public pathway between the Speicherstadt warehouses
The HafenCity primer project

An exploration into the importance and benefits of designing an architecture which strives to reconnect to nature was undertaken as part of the second primer project located in Hamburg, Germany.

Thus the design process began by considering Hamburg's historic relationship to its river which saw the creation of incredible infrastructural feats of engineering providing trade and business for Hamburg allowing it to become a rich and affluent city.

There was great potential seen to reframe the Elbe River as a socially significant resource. It was believed that a truly significant social relationship could be formed between Hamburg and its river once again through a focused reshaping of the harbour edge in a way which made powerful cultural/social spaces for the city. The scheme strove to design a new social layer which would connect both Hamburg’s city centre and the new dockland rejuvenation area referred to as HafenCity through a new relationship to the water’s edge. By drawing the main facilities of HafenCity to the extreme edges of the harbour, the axes between the old and new city are charged with a destination and focus (figure 26). These routes then become populated with more varied social facilities for the whole of Hamburg.

The process of investigating the site began by making an abstract group model made of grey card as shown in figure 21-23. HafenCity was divided into nine equal strips and each person made a representation of their interpretation of one strip. When all the strips were finished the model was assembled together as a first bold interpretation of the City. This group model then became the primary tool for examining HafenCity and exploring new ideas of cultural sustainability. We continued to develop proposals for Hamburg individually but always with a common philosophy in mind.

As displayed in figure 24 my individual proposal worked to add a new layer to an urban development scheme which lacked engagement to the natural surroundings. The proposal was quite simply a pathway built between the historical Speicherstadt warehouses. This new sculptural pathway would weave into the depths of the canal spaces between the warehouses exploring new heights and elements of the Speicherstadt façade while coming down to meet the water at certain points allowing the people of Hamburg to finally engage with the water. This new meeting of land and water would be used to encourage silt deposits in particular areas, allowing reed beds to develop while allowing for new levels to the water ways which could be developed to provide interesting courses for kayakers etc. This development of reed beds would encourage wild life into the area and the pathways could have the further function of becoming a new bird watching area.
This new public facility would enable different and unique experiences of the water’s edge and thus would create spaces which would allow for heightened bodily experiences and an increased sense of connection to the water.

**Connection to nature**

After the Hamburg project my thesis continued to develop by trying to work with nature and by striving to produce buildings which moved from existing situations to better more accommodating ones with nature. Alain de Botton once reflected “We owe it to the field that our houses will not be the inferiors of the virgin land they have replaced. We owe it to the worms and the trees that the buildings we cover them with will stand as promises of the highest and most intelligent kinds of happiness.”¹⁰

As the studies continued, humanity’s increasing disconnection from nature became more abundantly clear. What was unclear, however, was if this disconnection was a direct consequence of our streamlined and automated lifestyles or if the root of the problem ran much deeper. In Ken Robinson’s lecture to the Ted audience he initiates an interesting debate. Within the discussion he speaks about how our global education system has “mined our minds for a particular commodity”¹¹, that academic ability has come to dominate our view of intelligence which in turn has encouraged a sort of mass disembodiment, “There is not an education system in the world that teaches dance every day to children the way we teach them mathematics. Why? Why not? ...We all have bodies, do we not?”¹² If many of us are disconnected from ourselves, from our own bodies, how can we begin to reconnect to our surroundings and to nature? Thus maybe it crucial that design also adopts “new concepts of human ecology, which start to reconstitute our conception of the richness of human capacity.”¹³

A new concept of a new human ecology became increasingly intriguing especially when considering the possibilities for new relationships between land and water as experimented with already through the Hamburg project. Water in its natural diversity is slowly becoming disconnected from people’s everyday experience which is powerful evidence of man’s estrangement from nature as he is increasingly separated from the essential foundation of his life. As Wolfram Schwenk observed

“we banish water from our environment and allow it to appear for certain purposes only. And so we only perceive it out of context, in specific functions: as medium between tap and sink, as drink in a bottle, as rain in the street and in recent years as flood as well. The links, common to all, archetypal, waters context and its significance in nature are foreign to us. And yet we are talking about the most important basis of our existence, which cannot be replaced by anything else.”¹⁴
University of Limerick
Thermal bathhouse complex
The University of Limerick primer project

The third primer project began to find this question of sustainability at a unique crossroads. It started by implementing a vision for finding balance between a culture of consumption and the need for protection of a natural resource. A partnership was required between the thriving culture on campus at the University of Limerick and the cherishment of an immediate natural resource onsite, the river Shannon, which could offer a long term partnership for the future for the campus.

The site of the project was at the point of changeover between land and the river Shannon which is the area with the most diversity and is the zone along the river which has the most abundant source of life. After spending time onsite it became clear that many water based activities such as fishing, swimming, kayaking, dog walking etc were occurring along the river informally. The landscape is still quite wild and untamed and is one of the few public walkways along the river thus people were drawn to area. People were drawn to the water. Water is one of the most intriguing essentials of the whole world- it is constantly transforming and moving, yet through this perpetual continuity of motion it reaches a state of equilibrium. Water creates balance and equilibrium between extremes and this is why we are so fascinated by it.

The proposal was for a hybrid building which would connect to the river. The building itself would move out into the river and inspired by the Irish historical crannog island settlements it would be a series of circles in plan (figure 29). These circular forms acted as the most effective shape against the forces of the river against it. Within the circles there would be a number of different programs ranging from a protected swimming area, to a kayaking storage facility, to a sauna, to a fishing pier to a doggie pool (figure 30). Each island would have increasing and decreasing levels of shelter in accordance to the various programs. Between each of the circular islands the water was retained at different levels and released creating a series of rapids. In conjunction with replicating the rapids which had historically existed on site the rapids provided the sustainable energy required to power the sauna and kayaking facilities while providing a new exciting and invigorating kayaking rapid course (figure 28).

The design considerations of the UL project strove to increase the use of sustainable water systems and took care to try to utilize the river water as best as possible. Through connecting the people of UL to the water's edge the work hoped to change each person's habitual thinking paradigms and inspire them to take active behavioural changes when regarding their relationships to water. Through the design the river was treated with sensitivity and care while allowing for a celebration of riverside activities. The project experimented with water, played with water in a fun and delightful way. The projected studied water and learnt from water.
As a child I grew up in Monaleen on the outskirts of Limerick city. My most vivid memories are often to do with our family excursions to the riverside. The nearest places our family could get our fix of water and nature was either at the University of Limerick or the Clare Glens (figure 32 and 33). The Clare Glens in particular was a magical place for me as a child; it transported me to the landscape and time of the famous sagas such as Robin Hood. The Clare Glens itself is a scenic wooded area through which the powerful Clare River slices. The tight river route is punctuated mostly with cascading waterfalls and swirling fast currents which roar and batter against the underlying rock bed but occasionally it widens out and slows to create sheltered inlets and gentle calm rock pools.

Though I was always a good swimmer I knew instinctively this type of fast flowing water was dangerous and powerful, it could not be negotiated with and you were at its mercy. I remember my heart pounding when my dad would throw in a rock into the river's swirling depths for my dog to fetch. The dog would leap in delight, loving the water, and would pant and snort as he fought powerfully against the heavy swell and gushing currents which tried to forcefully push him further down stream. Upstream there lay little pockets of bays and inlets where the water calm and still. Here my family and I would swim in relative safety. There was something thrilling about swimming within these small pools beyond which the river grew into a cascading furious beast.

It was swimming and diving into the glistening rock pools of the Clare Glens that I first understood the primitive force of water as a natural element, its tactile quality and its powers of metamorphosis. Swimming in the river was beyond that of swimming in a pool. In the open water swimming became an activity which alternated between delight and fear, between control and submission as you delivered yourself with controlled abandonment to the forces of gravity, resulting in sensations of weightlessness and timelessness.

Water is essential to life in every form. It is one of the world’s most valuable resources and is justifiably referred to as “blue oil"¹⁵. The importance of water as a source of life goes without saying; we simply cannot live without it. "We consume at least two litres a day while access to clean and healthy water continues to be one of the most significant barriers to global health."¹⁶ Human beings themselves are made up of an estimated 60% of water and thus could be considered as "permeable spatial forms through which water is absorbed, stored circulated and expelled."¹⁷ Interestingly while water is crucial to all life on earth and it covers two thirds of the earth’s surface, only 3% of this amount is freshwater and about two thirds of that is inaccessible as it is in the form of ice. A startling 1% of all of the earth's water supports all of the life on earth. Therefore it is not surprising human beings are forever trying to preserve conserve, clean and reuse water. Nowadays an increasing emphasis is being made through new environmental approaches to living, working and playing which radically try to change our relationship to water for the better.
"Water’s ability to act as a metaphor for life, and by extension, health, is endless. In its mobile flow through the landscape, the course of a river is representative of the sinuous life-course experience of human health. In its often still presence as lake or pond, the therapeutic and calming natures of water are regularly invoked. As raging torrent, or wild-waved sea, the volatile and ambiguous nature of water is visible as an element of contestable health capable of both good and harm.¹⁸

Water is unlimited in its metaphorical expression. It has always been revered and considered valuable to bodily cleansing and spiritual revival especially in Ireland. There are a number of clear examples of places of water which have specific connections to health and healing which include springs, wells (figure 34), seas, baths, and spas.

“A deeply embedded and common expression in Irish vernacular culture, ‘the cure’, referred to a power certain places have. It attests to deep phenomenological and cultural connections with the therapeutic powers of nature, in which water remains prominent.”¹⁹

Counter to the life supporting properties of this elemental material, water can also threaten and even take life and we continue to battle against, barricading ourselves, for example against rising sea levels and the threat of flood. Recently extreme weather events make clear the dramatic reality of living with water. The threat of rapidly melting glaciers and rising sea levels due to global warming emphasizes the intrinsic relationship between water and the built environment as they have resulted in natural disasters as diverse as the extreme flooding in Australia to massively destructive tsunamis such as that triggered by the recent earthquake off the coast of Japan (figure 35). The scale of destruction and human tragedy as a result of these recent disasters accentuates the manifold connections between water and the built environment.

"The question now becomes whether we should build faster and harder to keep water out, or find a way to gently merge ourselves with water again, transforming the hard boundary into a continuum, a smooth transition, a commingling rather than a battle zone."²⁰

More recently the world is experiencing an explosion and celebration of cultures on the water's edge with cities such as Stockholm creating reinterpretations of their water's edge. Stockholm offers artistic, commercial, leisure and housing amenities near the water and encourages explorations of this natural resource. Its Archipelago offers a strong sense of place and blurs the boundaries between water and the built environment. Installation artists too are exploring this idea of the water’s edge. Olaf Eliason turned to urban waterways as a source of innovation in an effort to develop awareness of the intrinsic relationship between water and the waters edge. Through his work the “New York City waterfalls” he encourages an exploration of the water’s edge through illustrating the power of this natural waterway, its constantly changing state and its presence in the city.
The Shannon

Growing up in Limerick I was always aware of the Shannon River within the city and how deeply rooted the Shannon was to creating a sense of place within the city. The river Shannon itself is the longest river in Ireland and boasts a 234 mile long continuous water route; which runs from the west coast through to central Ireland (figure 36). The river has double this navigation mileage in terms of the length of its coastline and flows in a southerly direction, rising in the Shannon Pot in county Cavan on the slopes of the Cuilcagh Mountain and washing the shores of 10 counties out of 32 before entering into the Atlantic Ocean through the Shannon Estuary. The counties it passes include Leitrim, Roscommon, Longford, Westmeath, Offaly, Galway, Tipperary, Clare, Limerick and Kerry, all of which are abundant in population and all of which are vulnerable and susceptible to the fluctuations of the estuaries changing tides. On average for each of these counties 50 miles of coast is exposed to the river Shannon. This fact alone is sufficiently indicative of the instrumentality of this one single river. The Shannon River is also significant from an Irish historical, economical and social perspective and boasts much of the most beautiful Irish scenery along its course.

Limerick City

A distance of about 60 miles lies between the Atlantic sea and the city of Limerick and it enjoys a tidal difference equal to a height of 6 metres at the city quays. It is an ancient Irish city that sprang into being in the midst of what once was a wide flowing river which Edmund Spenser so accurately described as “the spacious Shannon spreading like a sea.”²¹ The name Limerick derives from the Irish word “Luimneach” which in turn according to Robert Wyse Jackson is “more than likely to be a derivative of the old Irish word “Loimenach” which means the bare marsh.”²² The Limerick then which the first settlers saw then was a wide, far-spreading tidal marsh surrounded by damp, rich and fertile land (figure 37). The philosophical survey of 1778 described limerick as a place “fortified by nature for without the annoyance of circumjacent hills it is built upon an island encircled by a strong barrier, the arms of the Shannon.”²³

Used for defence, trade, transportation, industry and recreation, the river Shannon provided the reasons for the founding of Limerick city and continues to define and play a major role in Limericks self image and lively, unique character.
In 1833 D. Hardy describes some aspects of the animated maritime city life in Limerick city at that time.

"At every opening to the westward, salubrious breezes from the Shannon inspire health and vigour, and a walk to the quays is amply compensated by the sense of busy traffic. Here the packet boat from Kilrush is landing her joyous passengers, whose nerves have been braced, and spirits exhilarated by some week’s residence on the shores of the Atlantic Kilkee or Malbay. There are turf and fish boats discharging their cargos, which are rapidly conveyed by herculean porters to the dwellings of the consumers, amidst various specimens of Munster wit. On the west are seen the distant towers of Carrigogunnel castle and the pool, where larger ships ride anchor in perfect security while many a skiff cuts the blue wave: on the cast appear the mill of Curragour falls built in 1672 and its rapid current, which roars and eddies amidst rocks of various shapes and sizes."²⁴

From this extract we get a lively description of the hustle and bustle of daily life in Limerick in the 18th century and how work, transport and recreation were infused with a deep rooted connection to the river Shannon as shown in figure 38 from around the same period.

Today Limerick City remains loyal to its deep rooted connection to the River Shannon and is sometimes affectionately referred to as being the “riverside” city. Some people remain aware of the great River Shannon running through their city by the rise and fall of the tide which constantly changes the mood and perception of the area but for the most part the majority of Limerick people live by the river but remain oblivious to its existence. Limerick, like many other cities has reconfigured, redrawn and hardened its water edge in such a way that many areas are built up to block and separate land from water. What began as gradual adjustments to the river's edge due to geological processes gave way to more frequent and more dramatic adjustments due to artificial processes over time. Its current shape has been in the making for tens of thousands of years and allows for few opportunities to negotiate a way to the water's edge within Limerick city centre. Through the building quay walls and filling its natural wetlands Limerick has succeeded in drawing a hard line between the water and itself which excludes confrontation and the possibility of new encounters.

The line drawing in figure 39 illustrates Limerick city’s changing river edge over a period of 323 years from 1685 to 2008. The years between 1685 and 1827 saw extensive construction of piers and hard edges along with the development of two docks, one at what is today called the potato market and the other at the present day Arthurs Quay. By 1865 and 1900 significant filling of land had begun along what are now Bishops Quay, the Dock Road and the Potato Market while a new large pier and dock had been developed in south limerick rendering the Arthurs Quay dock useless. By 2008 we see a Limerick City with which we are familiar with today. The pier to of the docklands to the south of Limerick city changed orientation while many further hard edges and land reclamations such as that in Arthur's Quay have occurred.
This edge map is beneficial in understanding how Limerick City’s waterfront is in a constant state of transition be it at the hand of man or Mother Nature. Yet to fully understand the state of the current coastline, the city was analysed beyond the shape of the river line itself and into both the material qualities of the water edge and its sectional characteristics.

Limerick’s river edge was investigated more deeply in figure 43 and divided into three main categories, that of a hard built edge, wetland edge and finally natural edge. The most common edge condition found in inner Limerick City was quay walls while paving and buildings covered the majority of the surface. However as you begin to move outside of the central city the hard edge between water and land becomes much softer and more natural. Thus edge conditions available within Limerick City appeared to be at either end of the spectrum. Off this map a number of sectional diagrams were cut at various points throughout Limerick’s different edges at a larger scale. The range of environments through which the sections were taken was extensive and tried to capture all the available river edge conditions experienced within the city. These ranged from Limerick City’s hard edges which included sections through the Docklands, the Canal Bank and the Abbey River, O’Callaghan’s Strand over to Harvey’s Quay and finally from King Johns Castle over towards Clancy’s strand, to the softer edges which included a section through a northern point of the King’s Island and a section across the Shannon river from Anglers’ Walk to Clonoughter.

After completing much of this river edge analysis it became of interest to try and speculate how Limerick City’s river edge may potentially change in the future. Some of the conclusions discovered through this speculation were startling.

Figure 41 above: Aerial photograph of Limerick city as it is today
Figure 42 below: Limerick city map from the 1900, note how much of the edge has been filled in and hardened around the central city
Figure 43 previous: Limerick city edge texture map. This maps the various water edges of limerick city from hard, to natural to wetland. This map was then compiled with sections taking throughout limerick, exploring various different conditions.
Everyone is in agreement that the world is warming up due to the build-up of greenhouse gases. For example, "current mean January temperatures in Ireland are predicted to increase by 1.5 degrees by mid-century with a further increase of 0.5-1 by 2075. July mean temperatures will increase by 2.5 degrees by 2055 and a further increase of 1 degree by 2075."²⁵ Due to this increase in temperatures sea levels will rise, inevitably, as glaciers and polar ice sheets melt and the ocean expands. The water surface will push further and further over land like an out of control stain spreading.

"The global sea level is projected to rise by approximately one metre by the end of the century, predominantly due to warming and thermal expansion of the ocean water body. As a general approximation, land retreat of about 1 metre can be anticipated on sandy coastlines for every centimetre rise in sea level. Inundation risk must also take into account storm surge events and high tide frequencies. A value of 2.6 metres for extreme water level presently occurs with a return frequency of 12 years on the west coast. These return periods of extreme water levels are likely to reduce considerably as sea levels rise. Combining these extreme water levels with a sea level rise of 1 metre places an estimated 300km2 of land in Ireland at risk of inundation."²⁶

On top of the rising sea levels Ireland could experience significant increases in winter rainfall, with the average winter water levels in the river Shannon higher than at present, and with serious flooding more frequent (figure 44). Areas now subject along the river to flooding will suffer flooding of greater severity and duration while areas currently flood free would suffer occasional floods. "Overall increases of 11% in precipitation levels are predicted for the winter months of December to February. The greatest increases are suggested for the west, where increases of approximately 20% are suggested by 2050."²⁷

On the whole "it is estimated that some 176,000 hectares or 2.5% of the republic of Ireland were at risk from sea level rise: this includes areas likely to be eroded, flooded, engulfed, or subject to environmental changes. The largest proportion of this land is located in the west of Ireland."²⁸

Due to Limerick city's position at the intersection of the fresh-water environments of the river Shannon transition to saline environment of the Shannon estuary the threat of global warming is double fold. It could experience coastal flooding from the rising tide levels of the Shannon Estuary or fluvial flooding from the bloated Shannon River due to increases in precipitation (figure 45). I began to explore how Limerick would potentially flood due to an increase of one metre in the tides through mapping it in plan and section. In plan the typographical contours were followed and the water level was increased by a metre (figure 46), while after discussions with the Foynes harbour master Hugh Conlon I created sections with accurate existing tide levels and potential increases in the future (figure 47). It became clear through utilizing and comprehending the section how these climatic

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Speculative Analysis

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Figure 44 above: Aerial map of the Shannon estuary which indicates the effected zones of the predicted increase of +1 metre to the sea level
Figure 45 below: Limerick city map of extreme flooding (discounting existing flood defence)
Figure 46 over: Limerick city flooding map showing the predicted one metre sea level rise due to thermal expansion of the ocean. It was constructed by following the contours of the land.
changes will threaten Limerick’s local infrastructures, ecosystems and communities. A substantial portion of the area of historical medieval Limerick City lies just above sea level and there is a prevalent risk that the city will be severely paralysed due to the predicted inundation (figure 48). Buildings and infrastructure at low elevations may face irreparable damages and public transport, quays and local streets will experience shut downs in the event of a major storm. Increased inflow to water control systems will result in overloaded waste water treatment plants. Surface water will no longer be able to be emitted directly into the river as is currently the case. The high tide table will be at a higher level than the drainage piping. This could potentially result with inflows into the drainage network resulting in an overloaded system and further flooding to the built environment. Saltwater intrusion into freshwater sources and wetlands will reduce the quality and availability of drinking water, increase erosion and weaken precious ecosystems.

The need to address these risks provided me with a thesis opportunity to rethink the relationship between the River Shannon and Limerick city’s infrastructure, ecology and society in the urban environment. Limerick’s conventional response to the river has been hard engineering: fortify its coast to protect against the alternating tides at the expense of nature. Yet this has gradually created a disconnection between the waterfront and the social, cultural and environmental life. It has resulted in the loss of some of Limerick’s famous marshlands, from which the City’s name sake was based, which diminished the variety of plants, fishes and birds that inhabit the area but also erased the naturally occurring buffer zone between land and water which mitigates the impact of the fluctuating tidal levels and lowers the risk of flood damage.

Thus my thesis design began with wanting to re-envision the treatment of the water’s edge in Limerick city and instigate new rational and philosophical bodies of thought based on different ways of working with water which use strategies which satisfy both the need to protect the city and diminish the damage done during times of storm surge and flooding but that also introduce new programs and opportunities for engaging with the water.
Figure 49: Map of Limerick city’s water services compiled from maps from Limerick City Council.

Figure 50: Section through the old sewer network of the Georgian houses at the Crescent in central Limerick. A vast network of sewers was built on the original ground level to cater for the population. These sewers are quite literally streets beneath the streets of Limerick. Each house on either side of the street had its own access to the sewer.

Figure 51: This section tries to describe the potential design of large storage areas for surface water throughout Limerick city during periods of high tide. With an increase of 1 metre to the tides by 2100 surface water will be unable to be emitted directly into the Shannon river as is the system today. It will have to be stored at various times throughout the day until the tide table lowers.
The Site

The site of the design proposal eventually emerged as the area ranging from the historical Sarsfield Bridge along Honan’s and Arthur’s Quay as far as the civic Courthouse at Merchants quay (figure 55). The site extends from New Town Limerick towards the King’s Island and is intersected in between by the arms of the Abbey River. It is an area that is dominated by its built historical legacy which includes the Hunt Museum (the oldest and most famous museum in Limerick), the Potato Market (the site of the historical medieval dock) and civic courthouse (just above which lies King John’s Castle).

The site was chosen for two reasons: firstly it emerged as place under serious threat of inundation. Secondly the water conditions onsite are some of the most exciting in the area, just above Arthur’s Quay to the north lies the jagged Curragour Falls, (figure 53) which transform with each swing in the tide from a rocky protruding outcrop to a kayaker’s dream course of fast racing rapids and whirling waterfalls. The different experiences of water onsite are fascinating and it was noted how the smallest of detailing altered the water’s behaviour dramatically and as a consequence our opportunities of interaction with it. The slight rhythmic shifts of the quay wall forwards and backwards created jets of fast pounding water along the protruding edges and pockets of lazy lapping water in the inlets between (figure 54). Poetically it is at this exact point where the slow running swampy river meets the first ford from the mouth of the Shannon Estuary.

The thesis proposal at Arthur’s Quay aims to reinvent the area as a central gathering place by the Shannon River and implements a series of water infrastructure strategies to alternatively defend or soak up flooding, while also creating a new place for the people of Limerick on the water.

By learning from techniques applied in landscape design it was decided that instead of building fortified edges, to break the project into a series of layered programs such as parks, marshland, fresh water storage, and building water breaks to create activities and destinations within the revived Shannon River front.

The idea then was that the city would become a place that is resilient to rather than fortified against the impact of flood. The project proposes a new infrastructural system for Limerick city, the components of which include constructed wetlands; piers and slips; and constructed islands. By combining these elements on the site in a range of ways new places for nature, leisure and production emerge on and along the river.

Thus the catalogue of intervention at Limericks water’s edge would work in both additive and subtractive ways creating zones of varying width.
The design proposal

The Reef Pathway

The first element of the proposal is what came to be referred to as the reef pathway. This pathway is subdivided into three undulating layers which stretch from Sarsfield Bridge to the Hunt Museum. These layers consist of a high porous outer layer facing the river Shannon, a low rising and falling layer in-between and a high defensive layer to the south bank which would protect the city from inundation.

The pathway would be zigzag in plan to serve the purpose of dispersing serious river currents as well as creating a protective zone against severe flooding and increased tides along the water’s edge. Each subdivided layer within the pathway would consist of protruding elements which push forwards and back, up and down. The outer layer allows the public walk alongside the river Shannon at a new higher perspective while at the same time allowing the river permeate through the walls to the inner layer between. This inner layer is low in places allowing itself to be inundated at particular times of the day in accordance to the changes in tide, so at low tide one can walk along the entire path, at high tide one can kayak along it. The high defensive layer to the south bank ensures that the river does not flood the city while providing the unique encounter of two different water experiences at either side of itself.

Overall this entire reef pathway would act to diffuse the water hitting itself allowing for the creation of sheltered inlets in between. It is an infrastructure which changes constantly with every swing in the tide; new routes would appear at low tide while new pools would emerge at high tide. In this way the landscape would be a continuum, always changing use and purpose with the dynamism of the shifting water levels.
Reclaiming land for the river

By cutting back into what is now the land of Arthur’s Quay Park the issue of storm water runoff and surface water storage can be addressed. By creating a new lock to the north of the site by the Hunt Museum and using it in tandem with the pre-existing lock to the south by Sarsfield Bridge the river can be sectioned off and controlled as a separate entity to the main river creating in effect a new dockland.

Here both the storm water and surface water can be stored during times of high tide and released during times of low tide. While this surface is being stored the water would be filtered through wetlands and permeable surfaces. The water could then be potentially harvested and reused after as filtered fresh water before letting it run into the saline Shannon River; thus treating surface water and potential storm water as a resource, not a problem.

Wetlands

Natural saltwater wetlands were once extensive along the waterfronts of Limerick city. As well as supporting the varied habitations of the estuary, these wetlands also acted as filters, removing sediments from the water. Constructed wetlands are designed to emulate these natural features, by treating storm water runoff, wastewater, and pollutants in a natural way (figure 60).

Thus the proposal for a reintroduction of constructed wetlands on the south side of the site would provide a habitat for a diverse range of life; providing visually appealing landscapes and public space for leisure and recreation such as the Lidos provided while all the time acting to filter polluted waters and remediate polluted lands.

Blurring this land/water interface with the texture, plant life, and depth of the wetlands also provides a natural buffer that adjusts fluidly to flood events and sea level rise. As wetlands are a resilient landscape, they can absorb storm surge and flooding and then naturally restore themselves quickly.
Break Water Buildings

Part of the design proposal includes a series of small island buildings along the edge of the new pathway system. These islands would appear above and below the water between the various tidal fluctuations. They would act as an infrastructural field of barriers which would disband the rough river currents hitting the waters edge and would also provide sheltered habitats for plants, fish, and birds; enhancing the river's habitat, with increased diversity and health while providing facilities for new program and recreational areas to be provided internally.

The facilities housed within these buildings could be diverse and variable, but for the purpose of this proposal they remained water related and included diving facilities, a sheltered external tidal bathhouse and a fishing/viewing pier. The buildings would be fixed in place and constructed for the most part in reinforced concrete which would again provide a defence against the rising currents by providing an obstruction which would disperse the energy of the water hitting the edge.

The Diving Pit

The diving pit is located to the west of the site and would be utilised by the public at high tide. The building is essentially comprised of three walls which work together to shelter a part of the river to ensure safe diving. The circulation then wraps along the inside of these defensive walls winding up to the higher levels of the diving boards. The walls shift high and low blocking and allowing the diver various different views as they climb up towards the boards. When they reach top they face south towards spectacular view of the city and the River Shannon.

The Pier

The viewing pier is located to the east of the site and faces towards the Curragower falls. Here the people can watch the Kayaking competitions which take place on the falls, fish or just sit and enjoy the river. It is made from reinforced concrete and works in relation to the tides also. At high tide the pier is mostly covered while at low tide the pier is totally exposed.

The Tidal Bathhouse

Finally located in the centre of the site plan is the tidal bathhouse. The tidal bathhouse can be utilized at any time of the day and is semi exposed to the elements. Made from reinforced concrete the walls of the building have designed cracks specifically located at the level of high tide. This would allow the water permeate through the walls during high tide and be held within pools in the building as the tide lowers. The water is then cleared and refreshed as high tide is reached once again. In this way the building would act like a sponge, holding and retaining...
water and then releasing it again. The internal circulation would be held between these wall networks and constructed out of wood allowing the water underneath to be heard and experienced at all times. The walls allow selected views and provide moments of compression and then release. The building itself moves from a higher level to a lower level allowing experiences of being above the river at one time and then being next to it at another while the pools allow the user engage physically by getting into the water. The water in these pools would be heated using solar and tidal power.

Through working with this small part of Limerick city and designing a portion of a system which could be applied at an urban scale the project tries to offer a functional, flexible and symbolic alternative. The project embraces the presence of water, through sloping surfaces and variety of new waterfront conditions and enhances the interaction of the city to the river Shannon.

The design tries to reinterpret the idea of the waterfront in Limerick city by creating new destinations with new possibilities to touch the water and actively engage with it through recreational and cultural programmes. The project would have a dramatic impact on the immediate environment of Limerick city, reframing the waterscape and providing new experiences that encourage a rediscovery of the famous Shannon River. The design strives to work with the water rather than against it.
Footnotes

Introduction

1. Ryan, Anna, “Edge Horizon” (unpublished PhD paper).

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