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Removing disability: the restorable powers of landscape design

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Abstract

In a rapidly urbanising world; the need for authentic wilderness experience is increasingly therapeutic and spiritually meaningful. Internationally known for its picturesque landscapes; New Zealand encourages both locals and tourists to experience them first hand by walking one of the many tracks around the country; an activity locally known as tramping. The Department of Conservation has identified a small number of these tracks as showcasing particularly picturesque wilderness areas; naming them the 'Great Walks' of New Zealand. These allow fit individuals to traverse unique landscapes over multiple days; staying overnight in rustic huts. The relationship between healthy wellbeing and outdoor experiences is well documented; however; not every fit individual is physically able to experience some of New Zealand's most significant landscapes due to the difficulty of access.

This paper combines elements of landscape architecture with the existing practises of design and construction in a conservation area to propose a new 'Great Walk' for New Zealand that would allow athletes with a physical impairment to experience New Zealand's unique landscapes. Physically pulling/pushing and maneuvering through 'backcountry' landscapes; this research-led-design approach breaks with traditional methods of inquiry through an expanded scope of research and through relinquishing the common practice of minimal interference with the natural environment. It permits the physically-impaired community to engage with difficult terrains in a multi-sensorial manner alongside able-bodied trampers; providing challenge to both. In doing so; provides the opportunity for physically impaired people to either continue trekking or to discover a new outdoor activity that not only improves their physical and mental wellbeing; but also allows them to establish personal connections to the land they are from or are visiting.

Keywords: wilderness; impairment; disability; wheelchair athletes; inclusive design; landscape architecture.

1. INTRODUCTION

The need for authentic wilderness and forests are increasingly important to maintain health and well-being in a rapidly urbanising world [1]. The restorative and therapeutic effects of viewing a natural landscape have been widely reported and are most beneficial when experienced for longer periods [2, 3]. Internationally known for its picturesque landscapes, New Zealand encourages both locals and tourists to experience them first hand by walking the many tracks around the country, an activity locally known as tramping. These allow fit individuals to immerse themselves in nature, traversing unique landscapes over multiple days and staying overnight in rustic huts. However, while the relationship between healthy well-being and outdoor experiences is well documented, those arguably in most need of therapeutic

benefits are denied access. Most fit individuals are physically able to experience New Zealand's most significant landscapes, however, those athletes with mobility impairments are unable to participate due to the difficulty of access.

Impairment and disability can be seen as two related concepts yet completely separate. Impairments are things which happen to the body or the mind that can become problematic, while disability is about the extent to which having an impairment in a particular time and place leads to disadvantage or even discrimination. Disability is strongly associated with dependency, care and charity. These associations are often evidenced in a loss of control over decision making and the tendencies for infantilising the impaired person.

This research explores the potential to remove disability through modifications to a multi-day track, which could allow a person with mobility impairment to independently experience the restorative powers of nature. The methods employed break with traditional methods of inquiry through; an expanded scope of landscape architectural research, an abandonment of the concept of minimal interference with the natural environment and through the use of a design led research approach. The research seeks to enable the physically-impaired individual to engage with difficult terrains in a multi-sensorial manner, independently or alongside able-bodied trampers. In doing so, provides the opportunity for physically impaired people to improve their physical and mental well-being; but also allows them to establish personal connections to the land they are from or are visiting as well as help rebuild self-confidence and esteem.

2. DEFINING THE DISABILITY

Throughout history, designers have applied models of mobility and ergonomics to inform their designs and develop an approach for the human body. Obvious examples of this are Leonardo Da Vinci's 'Vitruvian Man' and Le Corbusier's 'Modulor Man'. Darni Struijk, in her thesis 'Augmenting Access and Mobility', evolves these figures to illustrate a model of mobility and ergonomics that relate to someone confined to a wheelchair. Naming it the 'Prosthetic Human' she questions "the salient line between body and technology" and that it "stands for universality, accessibility and mobility where imperfection is the new ideal. The Prosthetic Human grid and scale offers a series of measures that reconcile to a human being in a wheelchair" [4]. In doing so it also identifies those measures that provide potential advantage for the chair-bound individual.

The current perception of a physical impairment is one of pure loss. However people who live with a physical disability actually tend to form other strengths through their body [5]. This ideology is illustrated in the documentary film 'Murderball' [6], directed by Henry Rubin and Dana Shapiro, which follows the American and Canadian national wheelchair-rugby teams and their pursuit for a Paralympic Gold Medal. Through the interviews and the in-game film footage, it is clearly evident that upper-body and core strength has been considerably strengthened as their body compensates for the loss of their legs. 'Murderball' highlights the fact that, despite partial paralysis, individuals can develop the strength and mental attributes such as courage, determination and athleticism, required to complete a challenging track.

While it is important to understand the physical limitations of a wheelchair bound person, understanding the mental impact is equally important. A research study of recently impaired individuals, found that there are four categories of mental difficulties that someone with a physical disability will experience; loss, frustration, humiliation and finally humility [7].

Constant fears of falling, the inability to do ordinary things with ease, and a continual need for help can make the new impaired individual feel that they are a burden on society. These emotions are essential to understand, as each will be fully tested when navigating a challenging track.

Emerging research finds that immersion in nature can offer mental and physical benefits ultimately contributing to a state of well-being [1, 2, 3, 8]. In her writing, 'Embodiment, Nature and Well-being', Barbara Humberstone conducts an investigation to prove these benefits associated with "being in forest and other green spaces" [8, p61]. Being immersed within nature affords an emotional experience that is unique for each individual, creating the sense of freedom that is not generally experienced within a city or town and allowing opportunities for spontaneity and adventure. Designing a track for impaired athletes will appeal to a specific demographic group. Rather than 'dumbing down' the landscape to be accessible for all. This research draws from evidence from within the able-bodied community where their ability to complete a challenging multi-day tramp in backcountry areas is not easily accomplishable by all. Traversing up to 15km in a day over steep and uneven terrain, participants must carry heavy packs containing food, cooking equipment, clothing, and bedding. Travelling through such landscapes not only tests a user's physical fitness but also their mental capability and they push themselves to the limits of their strength over what can seem to be never-ending inclines.

The aim of this research project is to develop a strategy for removing disability within outdoor settings that address impairment with respect and dignity, creating accessible yet outdoor environments that can challenge yet empower wheelchair athletes. The corresponding goal is to allow the opportunity for those wheelchair bound to connect to their local landscape. This paper proposes a new concept for accommodating impairment through the refurbishment of an existing, difficult multi-day track. This new track offers the potential for an intense physical and multi-sensory experience to be independently accessed for all of those who traverse it; be they able-bodied or impaired.

This study proposes a strategy of landscape interventions, drawing from a range of disciplines and contesting existing philosophies and practices with respect to landscape intervention. It seeks to empower not only 'physically impaired athletes', but all people who have an interest in the outdoors, but due to an incident or condition are no longer able to partake in tramping. Through the use of designed modifications this study enables these athletes and adventurer's to complete the track independently. It is designed to exploit the strengths of these individuals while minimising the effects of disabling elements that could advantage the able-bodied. It also removes the barrier of impossibility for all of those impaired adventurers who may be happy to live vicariously.

3. SITE AND EXISTING ECOLOGIES

Experiencing nature, and in particular wilderness, is an intimate and personal journey. To form the type of connection to the land that New Zealanders advocate, one must fully immerse themselves into the landscape. In 'Designing Wilderness as a Phenomenological Landscape', Mick Abbott breaks down how we experience such landscapes into two categories: the visual and the haptic. It is easy to gain visual contact and appreciation of the surrounding environment, however it is difficult to accept a pathway or a track as part of the indigenous landscape and its ecologies without being fully immersed on that landscape [9]. To fully experience wilderness one needs to not only see, but also feel the landscape.

New Zealand is internationally renowned for its picturesque landscapes. Popular travel guide, The Lonely Planet, wrote that it is the home of “sublime forests, mountains, lakes, beaches and fiords” making New Zealand “one of the best destinations on earth” [10]. Tramping within New Zealand is the third most popular activity, with 1.7 million people estimated to walk a track in 2013 [11]. Considering that New Zealand has a national population of just over 4 million people, this is a significant number. Among the 2,895+ tramping tracks around New Zealand [12], 111 are multi-night excursions and nine have been deemed ‘Great Walks’ that the Department of Conservation (DoC) has highlighted as their flagship tracks [13]. These outstanding landscapes are only accessible via rugged terrains and they are currently only available for those who are physically fit and able-bodied.

All of New Zealand’s multi day excursions are currently inaccessible to those who have a physical impairment that prevents them from walking. According to Statistics New Zealand and their 2013 Disability Survey, 24% of New Zealand’s population is classed to be living with some form of impairment [11]. Of this number, 18% of individuals over the age of 15 are living with a physical impairment which prevents them from walking. This equates to approximately 632,000 New Zealanders who cannot immerse themselves within the wilderness that New Zealand boasts about. This number significantly rises to approximately 980,000 disabled people when the inclusion of international tourists is added [14].

Utilising a research through design method for landscape architecture requires a test site upon which to develop ideas. Several tracks were surveyed, seeking to identify a suitability adaptable base track upon which to trial interventions. One of New Zealand’s most popular tramping areas is in the Fiordland region of the South Island. This area features spectacular scenery and varied landscapes, and has a well-established sports tourism support infrastructure. It is a location of three of the nine New Zealand Great Walks. In the same immediate area, the Hollyford track, a second tier multi-day trek was selected for modification for use by wheelchair athletes. This multi-day track features four predominant ecologies: forest, alpine, lake and wetland, each of which contains its own set of challenges for the wheelchair bound.

The forest typology consists of a variety of native flora and fauna of which forests cover 24% of the country [15]. Barriers in forest areas can include; uneven tracks due to tree roots; narrow bridges, difficult watercourses such as streams and waterfalls that cross the track; restricted way-finding due to concealed views and flat areas accommodating flooding.

The alpine typology tends to experience more extreme meteorological conditions than the sheltered forested regions. These exposed areas include rocky, steep and gravelly slopes with the potential for rock fall and land slips. Steep declines and inclines can limit the width of tracks and pose risks for falling. The thin soil levels endemic in this area contribute to fragile ecosystems and a lack of water retention and infiltration.

The lake typology poses the least barriers as the terrain is typically flatter and the ground less uneven; however, soft ground and muddy conditions can be difficult to traverse and any use of boats, canoes or kayaks to cross waterways require ease of access and egress which can be a barrier.

Finally, the wetland ecology is typically challenging for able bodied as well as wheelchair bound visitors due to the high water table, soggy ground conditions and abundant yet fragile flora. Sand and silt top layers of soil, with depths of as much as a half meter make crossings difficult for all. In addition to these barriers contained within the specific ecological areas, there are also a number of general barriers that exist throughout all tracks. These include; narrow pathways, inaccessible huts; narrow bridges and dangerous track edges.

Due to the isolated location of the track, the existing constructed elements such as huts, boardwalks and bridges are designed to be very practical and minimalist, which can constitute a challenge for the impaired body in terms of accessibility and mobility. Examples can range from inaccessible bridges to unbridged river crossings. In addition, the exposure of the track to meteorological events, such as rainfall, may contribute to damages from landslips. Throughout all ecological typologies, existing terrain is equally challenging due to the steep declines and inclines as well as the narrowing of the track at certain points and its poor marking.

4. DESIGN CONSIDERATIONS

The design considerations should bring forth the unique attributes of the physically impaired person, modifying the track to privilege their strengthened abilities and to eliminate disabling track features, addressing the physical challenges. However, designing a track for immersion in nature with references to emotionally laden views and multi-sensory experience is equally important. While the impaired athlete may traverse the track in a group mixing with the able bodied, completing the trek without the constant aid of others will create a greater sense of achievement and contribute to life-long well-being.

Understanding the disabled person's 'superpowers' will create a new way of tramping, unique to their abilities involving pulley systems, cable crossings and others mechanisms that to an able-bodied person would seem useless. Taking Stuijck's version of the Prosthetic Human as a starting point, the mobility framework for a person in a wheelchair has been modified to acknowledge new possibilities for the impaired body's range of movement. For example, the wheelchair can turn on a more defined axis compared with someone requiring full balance; i.e. an able-bodied person; through effectively using their arms as legs. This strength is constantly developed providing opportunities for lifting and movement around obstacles.

To explore means to overcome disability a wide range of existing technologies were explored, starting with the wheelchair itself. Much barrier free design is focussed on modifying the environment to remove disability; however, little has been done to redesign the wheelchair to accommodate flexibility and adaptability to the existing terrain and climatic conditions. Most wheelchairs have been designed for movement over even surfaces with limited physical obstacles and with gentle gradients. While the scope of this particular research did not extend to re-designing the entire wheelchair, it did consider modifications designed for the wheelchair athlete.

5. SOLUTIONS AND TECHNOLOGIES

When traversing places where there is an underlying risk such as the potential to lose control, a wheelchair athlete becomes fully reliant on their skill and strength with the wheelchair to remain in a safe state. However serious falls, the potential for losing their chair and the inability to safely recover are not acceptable risks. Solutions to these kinds of problems can be found within the climbing community. Here it is also the climber's skill and strength that keeps them safe but they are heavily dependent their knowledge and use of safety equipment [16].

Combining ideologies from rock climbing to the creation of independent physically disabled tramping, implies an intervention in the wilderness. Equipment such as fasteners and even ropes or cables are intended to be left in situ on the track. Adopting a balance of technologies could provide a method for independence, for example using professional climbing equipment designed for safety when dealing with tough slopes [17]. In particular, equipment designed to control speed and control direction of movement can aid the wheelchair bound.

De-acceleration systems can control one's speed when descending a steep section of track. Other technologies allow rope movement in a single direction making them suitable for ascending slopes but permitting the user to stop and rest safely [17]. Finally, devices that stop uncontrolled movement if a fall occurs can provide safety for both the person and their chair when faced with an immediate fall [17]. Combining these technologies in a backcountry environment, can enable safe navigation using a wheelchair in difficult terrain and provide a network of safety devices to use when faced with a high-risk situation.

6. THE EXPERIENCE

Landscapes surround our lives and subconsciously can direct us when walking, however the way our visual focus is commanded and our emotions teased in a journey is less well understood. 'Landscapes and Power' by W.J.T Mitchell [18] explores why we feel different emotions at different locations, challenging the existing notion of what a landscape is. This contrasts with the traditional understanding of a landscape as the sublime, picturesque and pastoral, and suggests that instead of provoking images for visual appreciation or interpretation, landscapes can create moments that impact and form an individual's identity. He argues that landscapes are too often "overlooked" and not "looked at" and that the majority of individuals make the landscape's power redundant by viewing it as a background:

However, it is not every landscape that can provoke personal experiences and emotions. Examples of landscapes which provoke emotion can be understood through artworks, in particular the artworks of the sublime. The Romantic painters sought to elicit emotion through their representation. The portrayed landscapes were often found deep in the wilderness and in areas few people adventure to. Based on these ideas and arguments, and analysing artworks of the sublime while reflecting on experiences often related to trekking activities such as Great Walks, eight emotional responses have been identified. These emotions are:

1. Fear: the point in the journey where mental capability is seriously tested.
2. Awe: a moment where one marvels at the wondrous landscape surrounding them.
3. Humility: a feeling of realisation of larger forces at play.
4. Frustration: a response to the winding/repetitive nature of wilderness and the possibility of getting lost.
5. Pride: an emotional pause reflecting on the journey to a desired location.
6. Reminiscence/Introspection: an individual reflection of the journey, through life and the track.
7. Freedom: a rush caused by the release from urban restrictions.
8. Spirituality: a personal connection between human and land.

It is evident through this research that emotions can elicit memories and experiences in people, which helps on establishing a stronger connection to landscape. Whether fear or pride, these emotions are detrimental to the narrative of the journey and making the overall track experience memorable.

7. THE NARRATIVE

Currently on the Hollyford track, a wheelchair athlete would be in constant danger of falling off the track or losing control of their chair as they ascend and descend slopes. Implementing a wide range of technologies and using specially designed wheelchairs, the user can safely navigate the challenging track. The same technologies can allow the designer to alter the user's orientation and direct their views to certain parts of the track, enhancing their experience. The rich experience is what inspires the visitor to continue the journey and discover the wilderness.

The first two days of tramping traverse through the forest typology along the valley floor and comprise the initial twenty-four kilometres of the track. The track meanders through native beech forest, crossing multiple streams and one dominant river. River crossings can be achieved through winch and rope technologies when modified bridges are not available. Taking inspiration from platform views, the design contrasts lookouts suspended over the landscape with spaces surrounded by wilderness. The lookouts also provide a sheltered environment for visitors, protecting from rainfall or other elements.

At the highest points of the track and the highest levels of difficulty and danger, safe crossing is provided through technology modified from rock climbing tools. These permits the physically impaired users to scale uneven sections of the track without the fear of falling backwards or forwards. With the high level of physical exertion, for able and disabled bodies alike, extra breaks in the track have been added to provide comfortable resting spots overlooking the native beech forest below.

The alpine typology is the smallest section of the track, spanning over 5.25km, and can be completed at the end of day three or beginning of day four. It is also the most powerful in terms of gaining a sense of wilderness. Passing through the edge of the beech forest into grass meadows, the space provides views over Lake McKerrow while being dwarfed by the surrounding mountain ranges, generating a sense of awe.

A relatively easy gradient across the alpine typology still require the design of a new bridge to cross over the Hollyford River and a hut refurbished for disabled access. The current river crossing involves use of an extremely narrow suspension bridge; which is inaccessible for a wheelchair user. Modifying historic river crossings devices designed to transport construction materials, provides a suitable alternative for river crossing, taking advantage of the wheelchair athlete's heightened upper-body strength.

The existing hut has been redesigned to focus the view towards the lake. This has been done by separating the hut into two identical sides, creating a passageway for the visitor to pass through, mimicking the mountain range on either side. This arrangement can enhance the sense of awe when viewing the surrounding landscape.

The third typology (lake) follows the edge of Lake McKerrow. The existing trail, known as the 'Demon Trail', is extremely difficult and not suitable for wheelchair access. To avoid it, the wheelchair athletes are able to kayak across the lake. To facilitate the crossing, a kayak landing and launching system has been designed. The new kayak access and egress system permits independent access, using a side transfer method to lower their body into the kayak and fold the chair for stowage and transport. The kayak is rested in a cradle in the water preventing any sudden movement during manoeuvring.

The final typology, wetland, is located on the opposite site of the lake to the existing track and occupies the final 8km of the journey. This side of the track showcases fragile and important ecologies such as wetland, lagoon, marshlands and sand-dunes, which are not prevalent on the Demon Trail side of the track.

The boardwalk constructed over the most fragile ecologies is designed to enhance the experience of the track for all users. Constantly changes to the direction of the path guide the eye to special moments in the lagoon and beyond. Moving over wetlands, marshlands and sand-dunes, this boardwalk aims to showcase and educate visitors of the importance and beauty of the fragile wetland ecologies around New Zealand.

The overall design strategies have been tactically implemented into specific ecological areas along the track, each adapted for their suitability to the area. The elements include modified huts, track technologies, lookouts, kayak launches and landings and an ecologically focused boardwalk.

8. CONCLUSION

This study provides the opportunity for re-designing a scenic trek within New Zealand to provide independent access for wheelchair athletes and the ability to immerse themselves in the landscape and experience wilderness. The combination of landscape architecture device adaptation of technologies from other activities/uses and the adaption of landscape architectural design principles can remove disability from the wilderness, allowing both physical access and emotional connectedness to the wilderness.

This research included developing a suitable wheelchair for wilderness treks; redesigning the existing accommodation; adapting existing specialised safety equipment; designing wheelchair orientated technologies for ascending and descending slopes, and wheelchair transfers in and out of kayaks. The use of embedded technologies permits the wheelchair athlete to 'feel' the landscape; pushing and pulling themselves with appropriate aids, physically feeling the imperfections of the track as they gain a greater appreciation for the landscape and form a closer connection to wilderness.

The final design produced an inclusive track; where able bodied and disabled people could complete the trek together through the redesign of the existing Hollyford track. The trek allows visitors to experience four different landscape typologies and challenges both their mental and physical strength. The inclusive track is designed by accentuating the existing natural systems to provoke a multi-sensory experience for both disabled and able-bodied, prompting emotional responses, inspiring personal memories and facilitating the social aspects associated with tramping the journey together.

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