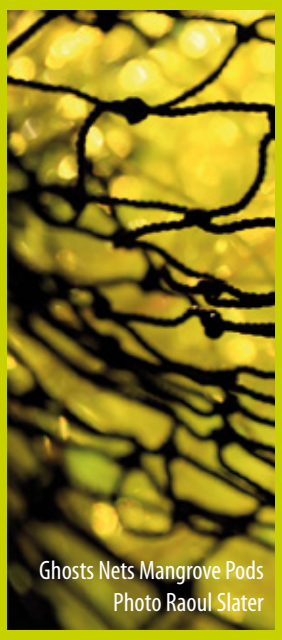
Future Nature, Future Culture(s)

balance un balance 2013
ARTS + SCIENCES X TECHNOLOGY = ENVIRONMENT/RESPONSIBILITY

Future Nature, Future Culture(s)

Peer-reviewed papers from the 2013 Balance-Unbalance International Conference

May 31-June 2, 2013
Noosa, Australia



Ghosts Nets Mangrove Pods
Photo Raoul Slater

Ship of Fools, James Muller & Kris Martin
Photo Raoul Slater

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CATALOGUING INFORMATION

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Themes: Eco-arts and environmental art – Challenging thinking – Challenges to human/nature dichotomies – Art/science/technology and trans-disciplinary practice – Soundscapes, nature/culture and technology – Social capital and sustainable communities.

Summary: "**Balance-Unbalance** is a major International Conference designed to use **art** as a **catalyst** to explore intersections between **nature, science, technology** and **society** as we move into an era of both unprecedented ecological threats and trans-disciplinary possibilities. The Balance-Unbalance International Conference was founded by Argentinean/Canadian artist and academic Dr. Ricardo Dal Farra in 2010 with the main goal to develop the role of the arts and artists in dealing with environmental challenges and trans-disciplinary possibilities"—Conference website.

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INTRODUCTION: FUTURE NATURE, FUTURE CULTURE(S)

Susan Davis
CQUniversity, Noosa

Introduction

It is clear that the issues facing our planet and future human existence are increasingly complex and multi-faceted. While humans may be inherently adaptable and innovative, the speed and scale of the problems confronting us require the concerted efforts of diverse thinkers and practitioners to address them. However, research, practice and publications in the academic realm are typically specialized and discipline specific. As Brewer identified, environmental problems require approaches which go beyond the conventional knowledge organization and the situation where "the world has problems, but universities have departments." (Brewer, 1999, p. 327). There is growing awareness that the defining and understanding of these complex problems as well as the solutions for addressing them requires cross-disciplinary, interdisciplinary and trans-disciplinary work and thinking. It requires working across traditionally distinct areas such as the Arts and Sciences drawing on all means possible to investigate, document, inform and experiment. This work also needs to draw upon networks and collaborations beyond academic bodies, crossing institutional and international boundaries. Work and methodologies that bridge these traditional boundaries can lead to new understandings and quality outcomes (Hirsch Hadorn et al., 2008). It is a space that requires collaboration, creativity, risk-taking and tolerance.

This is the type of space that the Balance-Unbalance conference has embraced and actively nurtured. The aim of the Balance-Unbalance 2013 conference in Noosa was to act as a catalyst for bringing together diverse people to consider the ways that the arts, science and technology could be used to confront some of the significant issues confronting our cultures and environments. By utilizing the arts, sciences and technology the goal is to find ways to embrace our shared responsibility to ensure the future of healthy ecosystems, 'natural' and designed environments and in fact, our whole planet.

To this end a conference brief was circulated internationally which highlighted the focus on the arts, sciences, environment, technology and sustainability. A strong field of presenters from over 14 countries responded to the call and the final group of participants included artists, scientists, activists, philosophers, sociologists, teachers, architects, engineers, academics and practitioners from a range of disciplines.

At the conference itself keynote panels papers, performances, installations, workshops and symposiums documented practice and research around a number of generic themes. These included work in different forms that is documenting and mapping what is happening, in specific environmental, human and social realms. Other work was concerned with challenging ways of thinking, seeing, hearing and understanding, and in many cases calling for shifts in perspective and paradigms. A range of work and case studies demonstrated examples of projects that are generating solutions and inventions, promoting awareness and change in active ways. For the purposes of this volume these themes have been elaborated through seven sections and the papers organised accordingly.

Eco-arts and environmental art

An increasing number of artists are exploring ways to raise awareness about environmental and sustainability issues through arts practice. The important role artist can play in communicating evidence is explored by Chandler, Baldwin and Marks. They identify the impacts of eco-arts events on people's attitudes, emotions and behaviours about the environment and sustainability issues. They explicate various aspects, types and impacts of eco-art practice with specific reference to the site-

specific event *Floating Land*, an Australian biennial program.

Bullot also investigates the functions and nature of environmental art. He defines its functions as different from those of Science with three key effects aimed for: broadcasting and surveillance of environmental facts emotion-manipulating processes and reflection-triggering functions.

Arts revisioning of the world - Narrative and story

Other forms of exploring human experience and relationships with the environments include various narrative creative forms. Nelson advocates for the role of storytelling and mythology as a means for re-balancing our relationships between biological and cultural systems. She identifies this as an important role for transdisciplinary artists to play to assist with providing the means for reimaging and transforming narratives and practices.

Archer-Lean, Carson and Hawkes elaborate on the ways that literature can play different roles in human/environment relationships through influencing human perceptions of nature. They suggest three modes of engagement, philosophical, literary and practical and suggest that through writing and engaging with literature it is possible to generate a consideration of different futures and promote change.

Ambrosetti takes the concept of stories about place as the means to engage students in learning within school contexts. Through the creation of web-stories, teacher education students are invited to learn about their local environment and design tools for engaging their own students. Together they may then consider global issues and possible futures through learning about past and present events connected through relevant local contexts.

Challenging thinking

Many of the presenters at the Balance-Unbalance conference question dominant paradigms and conceptualisations of human/environmental relations. Fowler-Smith examines human perception and our relationship with the land. She argues that human perception and visualization of the landscape impacts on our relationship and interactions with it. She draws on examples and imagery from Australian culture in contrast to those from India where for example certain trees are venerated.

Kalantidou questions most people's complacency and the reluctance to confront the unbalance of our consumption-driven lives. She draws on diverse literature to question the belief that life will remain 'settled' or return to a settled state after crisis. She draws on examples such as cyclone Sandy to illustrate how some groups, particularly in less developed countries have had to come to terms with living in a culture of 'unsettlement'. She asserts that humans need to reconnect with community and establish different relationships with work, property and material to redesign our world.

Challenges to human/nature dichotomies

While the title of the Balance-Unbalance conference suggests that humans may be regarded as distinct from nature, various presenters question such classifications and distinctions. Garafalo identifies problems inherent in discourse, practices and imagery that promulgate a nature/culture divide. She also questions romanticized visions of natural ecologies as ones that should be contained and untouched and all else viewed as damaged. She follows on from Morton suggesting an approach that sees the human-made and natural world all as constructed to varying degrees. She therefore proposes that the garden become a space and site for building an alternative ecological imagination, coupling man-made and natural systems. One specific garden installation - *Bouyant* is described and analysed.

Pirrie also interrogates what is considered 'Nature'. She draws on her experiences as an artist living in the Northern Territory to question and explore the concept of a 'return to nature' through her collection of coastal refuse including bottles and cans.

Art/Science/Technology and trans-disciplinary practice

Many examples of practice and research that draw on multiple discipline areas were profiled at the conference. Davidson and colleagues have been pioneering trans-disciplinary education at the tertiary level through the art/science fusion programs at the University of California. Students are able to fuse creativity and the pursuit of discovery. Their courses and assessment requires them to draw on scientific knowledge and investigation but to create art pieces and presentations including a cabinet of curiosity with a focus on the world of insects. The *Anastatica Sensibile* case study provides insight into a specific installation staged in Naples in 2012. This project utilized the natural processes of one specific plant to stimulate reflections about natural life cycles and human interaction.

With a focus on expression through visual form, Brunet draws on 3D sculptural practice and digital technologies to focus on the vulnerability of a Canadian icon – the salmon. She uses what she calls a hypermodern approach, where space-time and materiality can be questioned and explored in different ways. Livingstone's practice is also situated within the visual arts but also embraces the affordances of new media. Drawing on images from nature, she manipulates them to create hyper-real holograms and virtual environments that draw attention to what might be lost and what we regard as nature.

Soundscapes, nature/culture and technology

A growing community of artists and academics has been working with sound, music and technologies to record, create and respond to environments. Lacey introduces different approaches and discussions around soundscapes and sound ecologies, identifying prior preferences by certain sound ecologists for the preservation of so called natural soundscapes. He draws on the ideas of different acoustic ecology practitioners and theorists to move beyond nature-culture dichotomies to proposal alternative approaches to re-pattern the urban soundscape.

Kobayashi and Kudo provide a case study of a project which uses computing, in this case networked computing and sound. The proposition is for a carrier pigeon-like sensing system to be able to move into areas that are inaccessible, such as contaminated forests around Fukushima nuclear power plant. This prototype system has the potential to assist in generating self-repairing processes within contaminated natural areas.

In a form of practice utiising very every day tools and 'technologies', Tomlinson explains her process of responding to sites through deep listening. She then collects materials to create an instrumentarium and a playable environment of 'banal' and everyday objects. Improvised site-specific performances then result, which Tomlinson sees as a form of positive activism and engagement with the environment.

Social capital and sustainable communities

One way of realizing community aspirations for achieving a sustainable future is through the UNESCO Man and Biosphere program. Biosphere Reserves aim to promote conservation of significant ecosystems while also promoting sustainable development and learning and hence that is why the situating of the Balance-Unbalance conference in a biosphere reserve was seen as a natural fit. In this section the experiences of one Vietnamese Biosphere Reserve – that of Kien Giang – are shared by Chu Van Cuong and Brown, with a particular focus on management and cross-sectoral planning processes.

Another case explores community relationships and sustainability for a particular community, and this one is shared by Schaffer. She examines the importance of social capital and community bonds in one sector – that of the Queensland fishery industry.

The importance of learning about local cultures and practices is another theme explored at Balance-Unbalance, recognizing that there is much that can be learnt from revisiting practices from the past.

The Sunshine Coast based *Gubbi Gubbi Gun'doo Yang'ga'man* project has revealed how Indigenous people have long drawn upon their intimate knowledge of the environment to enact forms of what is now called bio-mimicry. In this case the design and making of traditional watercraft has been researched, documented and renewed. These practices were lost for over 100 years but are now being revived through Gubbi Gubbi people working with an historian, a curator and others to build new models.

This volume concludes with another local case study, that of Noosa Biosphere Reserve, the host site for the Balance-Unbalance 2013 conference. The concept of UNESCO biosphere reserves is presented as a community based tool for achieving sustainable communities and eco-systems, with the potential for promoting productive 'I/Thou' relationships. Partnerships and creative programs that utilise arts-based processes are highlighted as some of the means for achieving these preferred futures.

Conclusions

This collection of papers from the Balance-Unbalance 2013 conference represents a range of ways diverse practitioners and researchers are working to question, learn, inform and create possible solutions. Balance-Unbalance 2013 has sought to progress a range of conversations that explore how artists and others can collaborate to respond to the challenges of local and global ecological change. The event itself brought together passionate individuals and groups to share possibilities for inspiring positive change. We see this event as not just a conference, but also the catalyst for new ideas, collaborations and most importantly ongoing actions in shaping our collective futures. For widespread positive change to occur this type of sharing needs to continue and expand. We look forward to continuing the conversations and also seeing the results of further trans-disciplinary innovation that achieve (we hope) a sense of 'balance'.

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1. BALANCE-UNBALANCE AND OUR DAILY UNCERTAINTY: CAN THE ARTS HELP TO SAVE THE WORLD?

Ricardo Dal Farra
Concordia University, Montreal & Balance-Unbalance Convenor

Abstract

We are living in a world reaching a critical point where the equilibrium between a healthy environment, the energy society needs and the interconnected economies could pass more quickly than expected from the current complex balance to a complete new reality where unbalance would be the rule and human beings would need to be as creative as never before to survive. Have the arts a role in all this? Have artists a responsibility in this context?

Opening a path

When I started thinking about taking a more active role in looking for ways to help with climate change's related disasters through the arts, I wondered what my colleagues or specialists studying and working daily in preventing and acting upon the consequences of certain catastrophes would think about it. I thought they might respond with: "fine, but it is just another utopian initiative!", "… useless, come back to do your things", "art has nothing to do with being useful", "music?! That's a completely abstract thing, what could this have to do with real floods, droughts, earthquakes… or with dangerous insect epidemics?!"

To my big surprise, experts that had been already working with environmental disasters, scientists and engineers alike, answered my draft ideas with enthusiasm, telling me that it was the right path to explore now, because they had been trying to produce changes at different levels without the expected results. After consulting with my colleagues at the Electronic Arts Research Centre - CEIArtE - of the National University of Tres de Febrero in Argentina (Centro de Experimentación e Investigación en Artes Electrónicas – CEIARTE - Universidad Nacional de Tres de Febrero) a decision was taken about making a first attempt to see if this "good intentional" but uncertain initiative could turn effectively into something more tangible. The first *Equilibrio-Desequilibrio* conference ("Balance-Unbalance" in English) was born that way, very timidly but invested with a lot of energy, and openness to learning at the same time.

After exploring different alternatives, in about 3 months we put the pieces together, launching a call for participation, selecting the proposals and finally having a one-day conference in Buenos Aires on December 7, 2010: http://ceiarteuntref.edu.ar/eq-deseq-en

We had people presenting at the conference that came from very different fields: a representative of the National Secretary of Environment and Sustainable Development of Argentina; experts and students with chemical engineering, agricultural engineering and environmental engineering backgrounds -- some of them specialists in pollution, renewable energies or food technologies -- from different universities; a lawyer; a sociologist/philosopher; artists came from Argentina, Brazil and Canada; and astrophysicist Roger Malina from Leonardo (online).

Some important lessons were learnt that day. Firstly not many local artists were interested in participating at that time. Secondly, we were reaching very interesting people but they were already working in the field, or they were already concerned about climate change and the future of humankind as a consequence of its effects. An early conclusion was made at the end of that same day.

This was an excellent first step but we needed to reach those who were not already concerned with this now, we needed to reach artists as well as everyone else that could help in these crucial times.

Intersections

Less than one year later, and far from Buenos Aires, another conference was staged: *Balance-Unbalance* 2011 (a.k.a. BunB), held at Concordia University, Montreal on November 4 and 5, 2011 (see http://balance-unbalance2011.hexagram.ca/). Once again major effort was invested and the path was not free of stones. Balance-Unbalance 2011 was accomplished thanks to the financial contribution of several organizations inside Concordia University and the direct involvement of people coming from very diverse backgrounds, like communication, political sciences, geography, management, music, digital arts and design but all with a common interest. The common goal was to bring artists together with scientists, economists, philosophers, politicians, sociologists, engineers, management and policy experts with the intent of engendering a deeper awareness and creating lasting intellectual working partnerships in solving our global environmental crisis.

This second *Balance-Unbalance* international conference was organized in less than six months. In spite of the very short time we had for the whole process, many submissions were received to participate in the conference. These were not only for paper presentations, but also two evenings with films and electroacoustic music concerts, posters and artistic installations. We adopted an 'open door' approach encouraging transdisciplinary proposals, letting people send projects of up to 90 minutes that could have almost any format as long as the goals were clearly aligned with the conference expectations. The program of the conference can be found on the conference website (http://balance-unbalance2011.hexagram.ca/?page_id=229) and abstracts of all presentations are also available (http://balance-unbalance2011.hexagram.ca/?page_id=66).

Several new lessons were learnt this time. People coming from [very] different fields were able to talk and understand each other given some contextual conditions and a common goal. The specific results surpassed our expectations. The program that developed was rich and diverse centered around the focus: "… to use art as a catalyst to explore intersections between nature, science, technology and society… providing a powerful platform for reflection, debate, and ideas… aiming to provoke discourse around what our elusive future might hold and how transdisciplinary thought and action could be used as tools for positive change."

Wishes and expectations start to become a reality

The conference concept as a catalyzer started to work, art started step-by-step to come to the fore. Sometimes experiments take their own way and, our life being so full of a variety of simple/complex surprises, brought us a project and an excellent opportunity. *Balance-Unbalance* had no resources to invite keynote speakers for the conference, still we found a way to bring Pablo Suarez, Associate Director of the Red Cross / Red Crescent Climate Centre to Montreal. And as often occurs in these events, during a brief lunch between presentations, the seed for a leading project with enormous potential was born then. As a direct consequence of that *Balance-Unbalance* conference, CEIArtE and the Red Cross / Red Crescent Climate Centre, launched a global initiative: *art*! ⋈ *climate*. This resulted in a contest to create sound miniatures that the Climate Centre will use in its activities, such as workshops, simulation/educational games, lectures and presentations around the world.

In this way the Climate Centre's network will have material that will be useful for them and at the same time, we will be encouraging artists/musicians to read material about climate change and related problems, spreading information and encouraging artists to become more involved through their specific fields, creating art and perhaps taking further actions too. Even those who might would not be interested in participating and creating a work, could still be interested in reading about climate change and also on how the arts could help with this challenges we are all facing.

It is worth mentioning that the initial idea of having sound and musical material for their activities came from the Climate Centre itself, as a need. This is remarkable and different from other projects where artists make proposals to help. It is also significant because this humanitarian organization is in this way recognizing that art can be an articulator and could also provide enormous leverage for a more efficient and responsive effect for their actions.

This call has gone out with the idea of not having only one winner, there could be many works selected. In some ways, we will be all winners. The contest has two categories: one is 'Open' and it includes anything related to climate change and extreme weather events; the other is called 'Mosquitoes' and is related to the problems caused by mosquito-borne diseases, and the relationship of these with climate change processes. Dengue transmission is one example of where the incidence is increasing precisely because of such changes.

The call is the first step of a project focusing on sound-based art. The works selected by an international jury of well-known composers will be announced at this *Balance-Unbalance* 2013 conference. A variety of electronic/media art forms will be welcomed in the following stages. The next stage will be also explained during this conference

Collaborating

The team working on *Balance-Unbalance* 2013 has been collaborating with other organizations in the same spirit that has taken us to here. We have been joining forces with the team organizing the International Symposium on Electronic Arts (ISEA 2013) to develop some activities together. That conference will be happening a few days after *Balance-Unbalance 2013* also in Australia. The same spirit of collaboration can be seen though our partnership with the Sunshine Coast's Floating Land 'green art' festival.

We have been also working in close collaboration with Leonardo, the International Society for the Arts, Sciences and Technology. A selection of papers presented at *Balance-Unbalance* will be included in *Transactions*, a section in the printed journal Leonardo [The MIT Press] that publishes fully refereed papers in a fast track to disseminate key new results, ideas and developments in practice.

Some conclusions

Environmental problems, economic uncertainty and political complexity has been around for a very long time. Not one year, one decade or one century. What was different before was the speed and depth of transformations compared with today's fast changes. The frequent occurrence of certain events - such as floods, twisters, and so forth - seems to be increasing very rapidly. Human impact on the planet through modifying our adjacent surroundings as well as very distance places has the potential to change the whole planet, improving or ruining people's life and even eliminating all human life on Earth.

In this context of global threats how can the arts help? This apparently simple idea was the seed triggering the *Balance-Unbalance* project, the *art!* ⋈ *climate* contest, and also a new initiaitive that will be announced during the conference 2013. This initiative will focus on gather information and connecting individuals and organizations working on projects with similar goals to those of *Balance-Unbalance*.

As with many other situations we face in life, we need to gather information, reflect upon it and also act. It would be really good to have a lot of answers before we start doing this or that, being able to lower the uncertainty. We cannot act irresponsibly; on the contrary, we need to take responsibility, because on this will depend the life of humans on our beloved but badly treated planet Earth. At the same time, we know that we will never have all the answers. Of course there are many uncontrollable forces in nature that can affect us. In any case, let's go out of the comfort zone in leaving the accountability for others, and do your [our] best to have a better life for you [us] AND for others too.

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Author Notes

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2. CREATIVE EXCHANGES: ENVIRONMENTAL ART AS A CATALYST FOR DIALOGUE AND CHANGE

Lisa Chandler, Claudia Baldwin and Megan Marks.
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Abstract

For individuals and communities, the challenge of addressing a mounting global ecological crisis, understanding complex issues such as climate change and building a sustainable future can be an overwhelming one. Generating individual and collective action to facilitate change requires meaningful communication and a shared sense of values and direction, so what role can artists play in such processes? Creative practitioners possess astute communication and innovative thinking skills which can be applied to the dissemination of environmental information in imaginative ways. Additionally, artists' capacity to elicit emotional responses, present fresh perspectives and circumvent habitual ways of seeing can stimulate behavioural changes that support sustainable living. By employing open rather than didactic forms of communication and by engendering aesthetic or challenging experiences, artists open a space of questioning between the work and the participant/viewer. Increasingly, much eco-art practice is focusing less on a singular art object and more on process, including the processes of communication that the work catalyses through audience engagement and the 'dialogical exchange' that it fosters. Through such participatory and dialogical practices, artists can produce works which connect people with what they value within the environment and why they might choose to enact sustainable practices. This paper explores such processes of dialogical exchange in the context of the biennial, site-specific environmental art event *Floating Land* which, by 'merging arts and culture with science and the environment … aims to contribute to positive global change through education and conversations'. Examples are employed to consider, on a broader level, how artists and events such as *Floating Land* communicate about environmental issues and how they facilitate dialogical processes which foster reflection on environmental values and operate as catalysts for change.

Keywords: Ecological Art, environmental art, environmentalism, communications, Floating Land, dialogic exchange, art

Introduction

Globally, climate variability and change, population growth and economic development (specifically increased resource consumption and waste generation) are key drivers impacting on the environment. Together, these factors contribute to reduction in forest cover, increased extinction of plant and animal species, deteriorating ocean and reef health, and increased pollution and contestation over freshwater. Many of these matters are directly under human control but cannot be resolved solely at a local or even national level: they require collective global action (Climate Commission 2011; SOEC 2011). Generating individual and joint action to facilitate change requires awareness, meaningful communication and a shared sense of values (Adger et al. 2009). Multiple approaches and presentation modes are needed, and in this paper we consider how artists can contribute in this sphere. Compelling visual and sensory communication can be a powerful stimulus, with much evidence confirming that it can affect viewers' attitudes, emotions and even behaviour (Sheppard 2012). Additionally, long-lasting change can be fostered by 'affective responses that are personally relevant, inspiring and motivating', particularly when modes of engagement are tailored to an audience, employ social support and empower deeply held values (Sheppard 2012:36). We examine how creative practitioners and events such as *Floating Land* can contribute to such processes by cultivating dialogue and fresh perspectives which encourage reflection on environmental values and operate as catalysts for change.

Three key domains in which artists make valuable contributions are via creative thinking, eliciting emotional responses, and through participatory, reflective practices. These involve 'collaborating consciously' with an audience and, in eco-art practice, are 'concerned with how we connect with' each other and our environment (Gablik 1991: 158). Through such ecological and dialogical practices, artists can produce works which put people in touch with what they value within their environment. When discussion is generated around such works it can foster a sense of interconnection with the natural world and crystallize both emotional and intellectual understandings of why we might be motivated to take steps to enact sustainable practices. In other words, art can operate as a mechanism of engagement in challenging or affirming our environmental values and our commitment to acting on them. We draw on Whitmarsh et al's (2011:3) definition of engagement as incorporating one's 'personal connection with' the environment 'comprising cognitive, emotional and behavioural aspects … In other words, engagement encompasses what people know, feel and do in relation to' environmental concerns.[1]

Creative perspectives

How then do artists facilitate ecological engagement? Because 'the facts of climate change' do not always 'speak for themselves', creative practitioners can apply their innovative thinking and communication skills to re-envisioning environmental issues in imaginative and often memorable ways (Abbasi 2006: 97; Whitmarsh et al. 2011). Artists can operate in trans-disciplinary contexts complementing or enhancing scientific data as in Tiffany Holmes' (2006-2009) creative visualisation of changing energy use in an urban apartment (Holmes 2007; Holmes 2009). Importantly, creative thinking entails approaching subjects in ways that often sidestep habitual, systemic ways of thinking, doing and seeing. It involves challenging boundaries, imagining futures, invoking metaphor, constructing narratives and facilitating open-ended thinking (Gablik 1991; Wallen 2012; Weintraub 2012).

Typically, creative practice does not involve didactic forms of communication. Instead, the ambiguity, lack of fixity and fresh perspectives that characterise works of art, and artists' capacity to engender aesthetic, provocative or challenging experiences, can open up a space of questioning and invite dialogue between the artist, the work and the participant/viewer. Such processes are further supported by eco-art practice which often shifts the emphasis from singular art objects, focusing instead on process, community engagement and activism, including the processes 'of communication that the work catalyzes' and the 'dialogical exchange' that it fosters (Gablik 1991; Krester 2004: 90). In these situations, the audience 'is not regarded as distanced observer but as participant in the experience', so that artists, participants, the work and the processes generated by it contribute to a broader interconnected system (Wallen 2012: 235). This differs from the monologic approach – with its emphasis on individualism and separateness – that has characterised much twentieth century modernist art. In her seminal 1991 essay, Suzi Gablik proposed a relational model of art practice or a 'new participatory paradigm' which reflects ecological thinking. She observed:

> Whereas the struggle of modernism was to delineate self from other, [in a relational approach] the world becomes a place of interaction and connection, and things derive their being by mutual dependence. When everything is perceived as dynamically connected, art needs to collaborate with the environment and a new sense of relationship causes the old polarity between art and audience to disappear (1991: 150-1).

When this relational approach informs eco-art practice a dialogical space is created that can open up different ways of thinking and doing.

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[1] In the original quote, the authors refer specifically to climate change.

While individual works can have an impact, the biennial site-specific environmental art event *Floating Land* provides a valuable locus for collective environmental engagement. By 'merging arts and culture with science and the environment', it 'aims to contribute to positive global change through education and conversations' (Sunshine Coast Council 2013). Since its inception in 2001, *Floating Land* has incorporated a strong community ethos, a focus on dialogue, trans-disciplinary practice and responsiveness to place (Wilson 2006). Initially it involved creative works situated throughout the Noosa River catchment but since 2009 it has been located primarily at Lake Cootharaba at Boreen Point within the Noosa Biosphere Reserve, and has investigated themes including climate change and rising seas (2009), water culture (2011) and nature's dialogue (2013).

Events such as *Floating Land,* are comprised of multifarious individual projects which work together to form an organic system that supports experimentation, imaginative thinking and dialogical exchange. By bringing together diverse participants and incorporating works that are participatory, collaborative, time and process-based, multiple spaces are generated for reflective conversations and even setting aside habitual roles and perspectives around critical issues. When eco-art practices generate a sense of the inter-relationship of life processes this can connect people with what they value in a specific place, or the broader environment, and support contemplation on how one might take actions to sustain it. Although it is difficult to demonstrate that art's capacity to be inspirational, to present matters from fresh perspectives and to generate dialogue, can directly activate behavioural changes that support sustainable living (Weintraub 2012: xiii; Curtis 2009), our ongoing research project Visualising the Environment is examining these questions from qualitative and quantitative perspectives.

Catalysts for change

Behaviour change theory suggests that eco-art's facilitation of engaging experiences in and about the environment can contribute to pro-environmental behaviour (PEB) and behaviour change. Eco-art's capacity for evoking a space of questioning and generating reflection on environmental values, offers opportunities for social learning, influencing personal norms and questioning habitual routines. Personal norms are developed through social conversations where individuals hone their values and sense of responsibility by watching and interacting with others (Jackson 2005). In environmental communities, such as *Floating Land*, adults and children experience others acting with environmental concern and responsibility and choose whether to integrate these values into their set of personal norms. Additionally, participants can engage with cross-cultural perspectives, including indigenous knowledge systems, which can enrich understandings of how environmental stewardship is enacted.

Social learning is a process of 'iterative reflection that occurs when we share our experiences, ideas and environments with others' (Keen et al 2005:9). From a social learning perspective, to affect underlying values, 'triple loop learning' is required. This type of learning entails questioning, reflexivity and awareness of learning as a process. The deeper understanding that ensues supports shifts in values and norms that underpin existing assumptions and actions (Keen et al. 2005). Behaviour change can also occur when dialogues generated by eco-art practices stimulate critical reflection on personal environmental beliefs and behaviours, and this generates a move from routine or automatic behaviours to post-conscious or reflective behaviours whereby people think before they act (Heimlich & Ardoin 2008: Spaargaren & Van Vliet 2000). Engaging communities in collaborative learning experiences, approaching issues from imaginative perspectives and fostering reflective awareness of the interconnection between ourselves and our environment can create a fertile context for triple loop learning and facilitating pro-environmental behaviour.

Dialogical processes in practice

Ghostnets (2011), *Oceans of Air* (2011) and *At the Water's Edge* (2009) are examples of some of the numerous participatory *Floating Land* projects that have fostered dynamic interactions, reflective dialogue and social learning (Gablik 1991: 163). *Ghostnets* (2011) represented an imaginative,

collaborative response to a widespread environmental problem. When lost and discarded fishing nets are carried by currents they entangle marine life and wash ashore as refuse. In remote northern Australia, disposal of such beach rubbish 'has placed an enormous burden on local refuse systems (mostly landfills)'. Consequently, GhostNets Australia was formed to involve indigenous communities in weaving and fibre workshops, resulting in the transformation of discarded nets into innovative sculptural works. These operate as aesthetic, awareness-raising, and emotionally engaging tools as they visually connect with a larger project of research, net removal, and the recovery of trapped marine turtles (Ghostnets 2013). At *Floating Land* 2011, artists Sue Ryan (Cairns), Marion Gaemers (Townsville), Angela Torenbeek and Flora Jo Taylor (Moa Island, Torres Strait) were able to generate community conversations around these issues through an exhibition, workshops and community installation. The latter approaches in particular, were collaborative and process-based, allowing participants to take time to engage with these issues and weave in their own responses through reflective discussions and the resulting sculptural forms.

Oceans of Air (2011), was a collaboration between Spanish climate change scientist Ramon Guardans and Australian robotics artist Kirsty Boyle. The project comprised workshops and installations that brought attention to the science of air pollution monitoring. The artists and workshop participants worked together to develop creative methods for capturing air-quality data, and subsequently launched a large, clear weather balloon above Lake Cootharaba. Besides data, video footage was collected from high above the lake, which then contributed to an aesthetically and emotionally engaging night-time light installation. While the workshops reflected on the serious effects of air pollution, the balloon became an object of curiosity which generated conversations amongst festival visitors. For example, it drew the enthusiastic attention of a school group who were scheduled for a different workshop. Their fascination for the inflated sphere floating above the silent lake resulted in a spontaneous discussion centring on environmental science, with an international expert.

In 2009, researchers Claudia Baldwin and Lisa Chandler responded to the theme of climate change and rising seas, by conducting a photovoice workshop entitled *At the Water's Edge.* This project engaged three separate groups – participating artists, festival visitors and Boreen Point residents – in taking photos which reflected what they valued in living/being at the water's edge in critical times; what they perceived as threats; and what they valued about *Floating Land* as a vehicle for communicating about climate change and sustainable living. Photovoice is a collaborative, participatory process which uses photographs, and conversations generated around them, to bring shared concerns to a broader audience (Wang et al. 1998; Baker & Wang 2006; Carlson et al. 2006). Participants were asked to select nine of their photos, three representing each theme, which most effectively communicated their views. At separate focus groups, the three groups voiced their views in the context of their selected images. Within this dialogical space, shared themes emerged, resulting in the creation of a visual presentation from each group, enhanced with captions, which conveyed collective perspectives. The three groups' visual 'narratives' were exhibited and presented to a wider public audience at a forum on the event's final day, generating further conversations around shared concerns which emerged through the festival context. The presentations reflected commonalities such as the value of place and concern for the consequences of negative human environmental impacts. The visual and dialogical exchanges also drew out a reflection on and understanding of other's realities and a consideration of actions at local and broader levels (Baldwin and Chandler 2010; Chandler and Baldwin 2011).

While individually these varied projects fostered participatory processes, reflective conversations and fresh perspectives, by being presented within the context of *Floating Land,* enhanced dialogues and relationships were generated. A survey conducted in response to the *At the Water's Edge* presentations provided feedback indicating that participants valued the event because it enabled access to different perspectives (such as meeting Tuvaluan people), the capacity for multiple forms of dialogue and communication, and the motivational and emotionally engaging projects that *Floating Land* event facilitates. This was expressed in respondent comments such as: 'The diversity of perspectives, problems and solutions has given me a somewhat different angle on the issue', and 'a wonderful opportunity to meet, discuss and seek alternatives - with fellow residents as well as visitors of all

shades and cultures'. Feedback also indicated the event's impact in generating change: 'Help[ed] us decide to be more active with the cause' and its facilitation of projects of individual relevance, expressed in the comment: 'I'm already a convinced activist but this project has pinned down the issues to a local level' (Baldwin and Chandler 2009). Consequently, *Floating Land* provides a dynamic, interconnected system for creative investigations, social learning and exploring environmental values.

Conclusion

In critical times, artists and events such as *Floating Land* can make important contributions in facilitating individual and community engagement with ecological concerns. Through imaginative approaches, affective stimuli, and participatory, relational practices, artists can generate reflection and dialogue amongst diverse participants that is 'both informed by' and informs 'an "environmental value system"' (Wallen 2012: 239). Such processes can highlight connection with the environment and a sense of why individuals and communities might wish to enact sustainable practices. They can function as catalysts for change, fostering shifts in thinking, seeking and doing, and supporting pro-environmental behaviour. Behaviour change comes about through a number of processes, and here we have focused briefly on eco-art's ability to influence personal norms by social interaction, and the unsettling of habitual routines. We propose that eco-art is one approach amongst many inter-related and trans-disciplinary practices that can contribute to such change, and that further research will enhance understanding of eco-art's role in fostering values that support sustainable living. What is clear, however, is that creative thinking and collaborative practices are valuable in stimulating different ways of seeing – providing dialogical spaces in which people can voice concerns, visualise the invisible, experience empathy, appreciate alternatives, clarify values and imaginatively shape sustainable futures.

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3. A NATURE UNDER SURVEILLANCE: DECIPHERING THE CORE FUNCTIONS OF ENVIRONMENTAL ARTS

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Abstract

The paper investigates the significance of environmental art in the context of an increased scientific and technological surveillance of nature. An artefact is often classified as a work of environmental art if it is an artistic artefact that addresses environmental themes or issues regardless the medium, style, and advocacy chosen by the artist. What are the functions that set works of environmental art apart from the functions of scientific enquiry into natural phenomena and environments? How can we identify such functions? A framework is proposed that addresses these questions. In contrast to ahistorical conceptions, we expand historical and psycho-historical theories of artefact functions to explain effects of environmental artworks that are reproduced over history. Reproduced effects are identified that tend to cluster together in environmental art: broadcasting and surveillance of environmental facts, emotions-manipulating processes, and reflection-triggering functions. In contrast to views that assume the axiological neutrality of environmental art, our account predicts that the core functions of environmental arts tend to be tied to normative attitudes. To illustrate this normativity, we discuss how environmental arts can help us track indicators of environmental crises, and how artists can act as agents of psychological, historical, and political environmental change.

Keywords: Art, aesthetics, documentary, environment, functions, psycho-historical theory of art, surveillance, tracking

The mesh between artistic and scientific surveillance of nature

Nature has increasingly been placed under human surveillance. In this statement, I use *surveillance* to refer to anthropogenic processes aimed at keeping track of target phenomena over time for purposes such as the representation, explanation, and control of such phenomena. The scope of this broad concept of surveillance -- *qua* tracking -- is broader than the concept of *social surveillance* (Chesterman, 2011; Lyon, 2007). Although both concepts share a connection to the notions of control or manipulation, the concept of social surveillance usually refers to the monitoring of persons or groups by other social agents (e.g., governments, spies) whereas the broad concept of *qua* tracking is not limited to the social domain.

Both human arts and sciences engage in surveillance in the broad sense, surveillance *qua* tracking or monitoring. For example, the surveillance *qua* tracking of nature encompasses behaviour and processes as varied as:

- The act of following the spoors of a target animal in hunting (Liebenberg, 1990);
- The art of representing hunted animals on cave walls (Clottes, 2005);
- The charting and mapping of new territories;
- The depiction of landscapes and environment providing adaptive resources (Appleton, 1975; Kaplan, 1992; Mitchell, 2002);
- The measurement of natural phenomena by means of standard units (e.g., meter, second) and dedicated instruments, along with the invention of devices for representing natural phenomena that are difficult or impossible to represent — e.g., using microscopes for representing

microscopic animals or adapting photographic cameras for decomposing the movement of animates (Marey, 1894);

- The production and archiving of recordings of states and movement in environments, as in the production of photographs of environments, the audio recording soundscapes (Schafer, 1977), or the filming of agents and processes in environments;
- The filming of environmental or touristic documentaries;
- The use of non-human animals to perform reconnaissance tasks;
- The construction of biomimetic agents;
- The tagging of organisms with radio-emitting devices for studying their behaviour;
- The tracking of people online; or the practice of "dataveillance" and many other tracking and identification processes.

As illustrated by several of these examples, there has been a mesh between the artistic and scientific means for surveillance of nature. Photography and sound recording, for example, have served both artistic and scientific surveillance. Furthermore, the growth of human science and technology has expanded the descriptive and explanatory power of the resources deployed by scientific surveillance. Artistic works, in turn, have benefited from and inspired a number of modes of scientific surveillance. In this paper, the aim is to investigate the functions that set works of environmental art apart from scientific endeavours. We use the term *environmental art* to refer to works of art that address environmental themes or problems regardless the medium of expression, style, and advocacy chosen by the artist. We provide example of what we take as examples of environmental arts in Table 1.

The scientific surveillance of nature has served at least two core functions: explaining and manipulating. First, in making the representation of natural phenomena possible, scientific surveillance has enabled the development of *mechanistic explanations* of such phenomena (Bechtel & Abrahamsen, 2005; Craver, 2007). Second, in combination with explanations and technical power, the scientific surveillance of natural phenomena is a condition of the human capability to *causally intervene* on natural mechanisms. Because scientific surveillance can fail to perform these functions adequately or perform them in problematic ways, human interventions on natural mechanisms have led to errors, risks, and disasters (e.g., nuclear accidents, climate change, environmental pollution with toxic industrial wastes).

The appeal to mechanistic explanations does not appear adequate to account for the functions of surveillance in environmental artworks. In contrast to scientific theories, works of environmental art engaged in representing and intervening in environments do not have as core functions the measurement of phenomena or the explanation of causal mechanisms. For example, though they depict and manipulate natural phenomena and mechanisms, the works listed in Table 1 do not represent such phenomena in ways that follow common scientific practice. What, then, are the functions of environmental artworks?

Our paper sketches a framework to address this question. In contrast to conceptions that keep aesthetics and arts separated from functions, we expand the research of Parsons and Carlson (2008) and Bullot and Reber (in press-a, in press-b) to account for artistic functions understood as effects reproduced over history. Then, we focus on the investigation of reproduced effects (functions) of environmental arts. We describe how the identification of such effects is key to providing a historical understanding of environmental arts. Finally, in contrast to views that assume the axiological neutrality of environmental art, we argue that core functions of environmental artworks can be normative and enable the appreciator's reflective and critical assessment of indicators of environmental crises.

Reproduced psycho-historical effects and functions in the arts

Works of art have functions. To establish this claim as a substantive hypothesis, we need a theoretical account of the genealogy of artefact functions. Among the numerous theories of functions (Ariew, Cummins, & Perlman, 2002; Wouters, 2005), historical theories offer a promising explanation (Bullot & Reber, in press-a; Parsons & Carlson, 2008; Preston, 1998). According to historical accounts, the *functions of an artefact* are intended or unintended effects reproduced over history because these effects met some need or value.

Works of environmental art, for example, exhibit characteristic types of reproduced effects that might be reproduced because they meet the need of artists, curators, and audiences. As we further argue below, these reproduced effects might encompass actions aimed at generating representations or descriptions of environments (e.g., landscapes or soundscapes), having audiences experience unexpected or remarkable environments, inducing reflective thinking about environmental issues, or providing people with motivation for engaging in political action related to the environment. It is arguable that the reproduction of such types of effects occurred over the course of the history of environmental arts because such effects meet the mental and social needs of the agent who produce and appreciate environmental arts. Thus, these types of effects are functions in the sense of effects reproduced because they meet some needs.

In an attempt to combine the historical and psychological traditions in art theory, Bullot and Reber (in press-a, in press-b) have expanded this account of artistic functions with a number of psycho-historical hypotheses on the historical genealogy of both art functions and the appreciators' sensitivity to art functions. To introduce the concepts of the psycho-historical approach, we can articulate some psycho-historical hypotheses about artworks that have documented the poisoning crisis in Minimata (Japan), such as Eugene Smith's series of photographs on Minimata (Smith & Smith, 1975) and the documentary film *Minamata: The Victims and their World* (1971) by Noriaki Tsuchimoto (henceforth "*Minamata*"). It is the first in a series of documentaries that Tsuchimoto made about the mercury-poisoning incident in Minamata, Japan. This documentary focuses on the residents of Minamata and nearby communities who suffered damage to their nervous systems, or who were born deformed, because they ingested seafood containing abnormal amounts of methylmercury released into the sea by a factory owned by Chisso. The film documents the conditions of victims, the discrimination these victims suffered from other Minamata residents, the insufficient response by Chisso, the slowness of government action, and the problems faced by victims who had not been officially designated as suffering from "Minamata disease."

The psycho-historical theory of art (see Figure 1) combines a historical model of the production of a work of art (left side of Figure 1) with a psychological model of art appreciation (right side of Figure 1). According to the historical model, the making of a work of art is the product of a particular art-historical context. The *art-historical context* of a work is the network of agents, institutions, marketplaces, and historical processes that are causally involved in the production of this piece as work of art. For example, the art-historical context of *Minamata* by Tsuchimoto is the artworld and historical context of Japan in the 1960s and 1970s, which is that of a growing economic and industrial power.

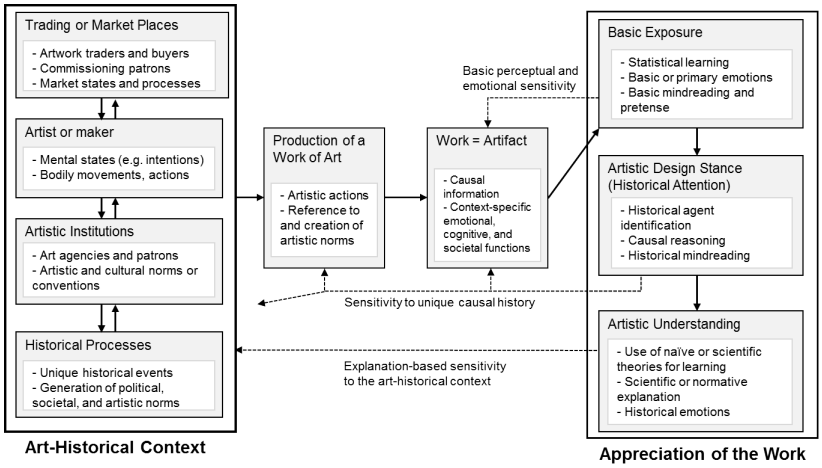

Figure 1 Relations posited a the psycho-historical theory of the appreciation of art functions (adapted from Bullot & Reber, in press-a). *Meaning of the symbols*: Solid arrows refer to causal connections, which are assumed to occur with important feedback loops (not depicted). Dashed arrows refer to different types of sensitivity of the appreciator to art functions and art-historical contexts.

Agents' actions and historical processes generate moral and social norms, including artistic norms that constrain what is possible and permissible in the art-historical context. For instance, in depicting and broadcasting the effects of poisoning in Minamata, it is likely that Smith's and Tsuchimoto's artistic actions were motivated by moral and political norms, such as moral principles entailing that the treatment of victims was unjust. Their artworks are political devices aimed at disparaging the profit-seeking norms that triggered both the poisoning of many inhabitants in the city of Minimata and the covering up of their sufferance. Like *Minamata*, many other environmental artworks have selected effect (functions) that are reproduced because they fulfil that mental and societal needs of groups of agents in the art-historical context, such as the avowal of certain norms and values. Of course, within the process of its making and transmission, a work of art can gain and lose selected effects (functions). For instance, *Minamata* might have lost some of its original functions since 1971 because of changes in its societal and political context detrimental to the original functions. Understanding the functions of an artwork that are no longer extant is nonetheless valuable to the development of a historical understanding of this artwork.

According to Bullot and Reber's theory (in press-a), one can identify at least three distinct modes of art appreciation (see the right side of Figure 1). The first mode, *basic exposure*, roughly occurs when appreciators are exposed to effects generated and information carried by the work in the course of its perception but do not have or seek knowledge about the history and art-historical context of the work. For example, basic exposure to *Minamata* would occur when an appreciator is exposed to an isolated segment of the documentary without possessing any knowledge about the historical context of the documentary.

In the second mode of art appreciation, appreciators adopt an attitude of enquiry into the causal history of the work, a 'design stance' (Dennett, 1987; Kelemen & Carey, 2007). The *artistic design stance* is an attitude whereby appreciators infer from observable information carried by the work of art non-observable information relevant to its appreciation and related to its causal history and art-historical context. For example, it occurs when appreciators of *Minamata* begin to seek knowledge about the historical context of that documentary, seeking an understanding of the relationships between the different agents in the art-historical context of the production of the work (e.g., the victims, the artists, the perpetrators, the audiences, and the bystanders).

The third mode, referred to as *artistic understanding*, is an understanding of the context-dependent art

status and functions of the work that result from knowing key aspects of relevant art-historical contexts as a consequence of using the design stance. For example, an appreciator of *Minimata* gains in artistic understanding of *Minamata* if this appreciator can explain the significance and selected effects of the work by means of explanations and feelings that are sensitive to the art-historical context and causal historical of *Minimata*.

The psycho-historical model predicts that the three modes of appreciation correspond to three different ways to become sensitive to art-historical effects and functions. Although basic exposure to a work could provide the appreciator with sensitivity to certain functions (e.g., the representational function of a landscape painting), it cannot provide the causal explanation and understanding necessary to the ability to identify the genealogy of context-specific functions. The latter understanding demands that the appreciator engages in an explanatory stance, such as the design stance, and forms a model of the context by means of artistic understanding.

Identifying the core functions of environmental arts

Because environmental arts encompass a wide range of genres, styles, and media, we should acknowledge the plurality of effects that they have on their makers, commissioners, audiences and ecological contexts. For example, the production and appreciation of environmental documentaries entail causal interactions between artists, institutions, and audiences that differ from those associated with the production and appreciation of environmental poetry or photography. However, not all these effects are functions in the sense specified by the psycho-historical model; that is, types of effects that are reproduced over history because of they fulfil the needs of people and societies. If one focuses one's attention on the latter, we submit that one can identify at least three types of core functions that tend to cluster together in environmental arts: (1) *broadcasting and surveillance functions* (e.g., information broadcast aimed at eliciting tracking of, or knowledge about, events and agents in target art-historical contexts); (2) *emotions-manipulation functions* (e.g., the manipulation of emotional responses to motivate the appreciators' avowal or enactment of political norms); and (3) *reflection-triggering functions* (e.g., the violation of expectations for triggering reflective thinking about the content represented). Although such processes occur in domains other that environmental arts, their combination is that which we take as specific to works of environmental arts.

Broadcasting and surveillance functions

A core function of at least some works of environmental art is to broadcast selected sources of information to elicit knowledge of an environmental context. Because broadcasting presupposes surveillances *qua* tracking (see earlier discussion), one may subsume this class of effects under the concept of *broadcasting and surveillance functions*. Although broadcasting effects are present in domains other than the environmental arts (e.g., scientific, journalistic, and pedagogical communication), we posit that makers of environmental art have recourse to broadcasting modes that are distinctive, at least in the fact that the broadcasted material is introduced and categorised by means of art-historical art concepts (e.g., "documentary" [as a recent genre of art] or "music performance").

In environmental arts, works based on photographic, sonic, filmic, and video recordings often provide appreciators with means to track indicators of environmental facts and crises that would otherwise remain unperceivable or unconceivable. For example, the documentary *Minamata* provides its audiences with recorded testimonies about the life of victims of mercury poisoning in the city of Minamata. Without the documentary, such testimonies might have been successfully silenced and consigned to oblivion by the perpetrators of the poisoning. The film provides audiences with the means for breaking social silencing and keeping track of human agents who played a role in the making of the disaster in Minamata, thus enhancing our understanding of depicted historical context.

Broadcasting functions are at the core of a wide range of works of environmental art, especially those based on recorded media such as photographic works and documentaries (see Table 1 and the discussion below). Why do they seem distinctive of environmental arts, and especially in works addressing the topics of environmental crises? We think that their link to environmental arts comes

from the fact that the causal processes that environmental artworks depict are often unobserved or unobservable effects, or even side-effects and downstream causal ramifications that were only detectable long after their chief cause had been generated. What is characteristic of such unobservable effects or side-effects is that a human enquirer cannot perceive them directly by means of unaided perception.

Many hazardous chemicals released in our environment cannot be readily detected by unaided human sensory abilities (Wargo, 1998, 2009). For example, methylmercury was not directly perceivable in marine life collected and consumed near the shores of Minamata. Similarly, no one could directly perceive the degree of toxicity of the dust generated by the collapse of the World Trade Centre (Lioy, 2010). Furthermore, a number of important ecological facts are left undocumented. For example, there is evidence that key events that have caused species extinction and loss of biodiversity are poorly documented (Wilson, 1992). Similarly, important ecological concepts such as *global warming* or *imbalance in an ecological system* refer to states of affairs that cannot be directly sensed by a perceptual system.

Some of these unobservable states of affairs are indicators of environmental crises that are represented and broadcast by works of environmental art, and the psychological processing of these works contribute to developing our sensitivity to such environmental states of affairs. The psycho-historical theory (Figure 1) suggests the hypothesis that they might achieve that result by inciting us to adopt the *artistic design stance*. For instance, in taking the design stance, appreciators engage in causal reasoning about the historical context and causal history of the work. In contrast to mental processes performed in the mode of basic exposure to an artwork (that is, without any inquiry into the causal history of the work), causal reasoning based on the design stance provides appreciators with a means to assess the sources and reliability of the information conveyed by the work.

Emotions-manipulation functions

Sole reference to the broadcasting of information is not sufficient to explain the normative significance of environmental artworks. Normative effects are more likely to be elucidated by means of an analysis of the mechanisms whereby artworks manipulate emotions. Roughly, the broadcast of content by an environmental work induces the appreciator's emotional responses. Such emotional response, in turn, motivates appreciators into avowing and abiding by specific moral or political norms (e.g., Gibbard, 1990). For instance, environmental artworks often broadcast indicators of an environmental crisis (e.g., poisoning in *Minamata*) that elicit emotions such as fear or anger and motivate the audience to abide by mitigating norms.

A consequence of the psycho-historical model (Figure 1) is that emotions elicited in the mode of basic exposure differ from those elicited in the mode of artistic understanding. In the mode of basic exposure, art appreciation is led by implicit learning processes and basic emotions that respond to the *observable* content and form of the work.[2] For instance, appreciators who would attend to the documentary *Minamata* in the mode of basic exposure could experience primary fear elicited by the depiction of deformed bodies or convulsions and empathy for the victims. However, they would not engage into deliberate inquiries into the making of the documentary and its historical context. Consequently, their appreciation would remain deprived of the numerous sources of information provided by the historical analysis. Arguably, this would impair their ability to reliably infer the contents that the filmmaker might have intended to communicate. Similarly, it would hinder their understanding of the societal and political mechanisms leading to this kind of environmental crisis.

[2] Emotional response in the appreciation of environmental art restricted to the mode of basic exposure is limited in a variety of ways. In the first place, the inferences that can be drawn from knowledge of the art-historical context of Tsuchimoto's work cannot be made. (For instance, the knowledge of the artist's intentions or biographical context is limited or absent.) Furthermore, in this mode, the appreciators cannot assess whether the emotions that they experience in the course of exposure is appropriate or fitting because they lack information about the context-specific norms that make these experience appropriate or inappropriate.

Finally, they would be deprived of a justification for deciding whether their experience of basic emotions is fitting or adequate.

In contrast to appreciations limited to basic exposure, appreciators who develop artistic understanding on the basis of the design stance (Figure 1) can derive emotions and feelings from enquiries into the contextual functions of *Minamata*. For instance, they may articulate explanations of the work based on the premise that Tsuchimoto's intention was to elicit empathetic understanding of the victims' world and of the silencing of their narratives (Fricker, 2007). In doing so, appreciators can deploy a refined sensitivity to the norms upheld or disparaged by Tsuchimoto's work (e.g., moral norms versus norms dictated by the predatory greed of the perpetrators). On the basis of this contextual sensitivity, they can develop a range of historical emotions and practical responses to the societal mechanisms investigated by Tsuchimoto.

Reflective functions and the explanatory stances

On our account, works of environmental art are systems designed to elicit the search of environmental knowledge by means of the manipulation and broadcast of information (broadcasting function). Environmental artworks can motivate action and norm-abidance by means of the manipulation of emotions (emotions-manipulation function). Thus, they are vehicles for communication acts that intertwine knowledge-eliciting and action-eliciting functions. Their societal role stems from the fact that they play a role in raising awareness of environmental facts and crises in the public debate.

The reader might be concerned that, on our account, no clear boundaries separate environmental artworks and works of propaganda. For example, environmental artists might often be faced with the difficult task of having to address an environmental crisis without having sufficient knowledge to adjudicate the dispute about the environmental crisis. In such a situation, using art to support a partisan view might amount to propaganda (Tuttle Ross, 2002), which might be biased by simplistic heuristics (Kahneman, Slovic, & Tversky, 1982; Tversky & Kahneman, 1974). However, there are ways in which environmental arts can avoid becoming propaganda. Such arts can focus on eliciting, in the appreciator, reflective attitudes aimed at questioning that is claimed about the environment, or which might have been concealed about the environment. Table 1 provides examples of effects pertaining to such reflective functions. Arguably, the elicitation of the appreciator's reflective thinking is preferable to approaches based on indoctrination and propagandist partisanship. Because of the pervasive risk of turning environmental arts into simplistic propaganda, we think that a key function and contribution of good environmental art has been to guide audiences into adopting reflective forms of understanding as a consequence of adopting the design stance (see Figure 1).

A related issue is that such artistic reflective sensitivity to environmental facts or crises is hard to conceive if it is deployed in complete absence of an understanding of the causal mechanisms determining the environmental fact under artistic consideration. Thus, at least in principle, reflective artistic sensitivity to environmental facts can benefit from insights provided by the natural and social sciences of such mechanisms. Hence, environmental artworks are unlikely to succeed in their moral and political functions if they dramatically lack reliability in the performance of their surveillance, broadcasting, and reflective functions.

Tracking environmental crises by means of art

Numerous works addressing the topic of environmental crises can provide evidence to support our account of the core functions of environmental arts. Table 1 provides a series of examples and outlines how such works connect to the functions outlined. Many of these works document environmental changes or crises. In each case, we specify the processes whereby these works perform the functions posited. Several schools of documentaries and sonic or photographic works addressing the topic of environmental crises provide a remarkably rich set of examples (see Table 1).

In making traces of environmental crises publicly available by means of media of the age of industrial reproduction (Benjamin, 1936/2008), works such as *Minamata*, *Koaanisqatsi*, and *The Cove* broadcast information about a variety of environmental crises (Table 1). Though they might misrepresent

historical facts or present biased assessments of historical controversies, such works have a realistic significance that derives from the fact that they assemble recordings that are, to greater or lesser extent, *traces* of past state of affairs (Bullot & Reber, in press-b; Currie, 1999, 2000). In the documentary *Minamata*, the film assembles traces such as portraitures by relatives of deceased and living victims and depictions of pipes pouring industrial wastes into the ocean. The realistic significance of these works may also derive from the direct use of surveillance methods and technologies (e.g., the use of undercover equipment in *The Cove* or the use of methods of enquiries analogous to forensic and journalistic enquiries in many other documentaries).

The content broadcast by these works can be aligned with moral or political norms, and organised by rhetorical strategies. Political strategies understood as strategies aimed at intervening in agreement with certain moral, legal, or political norms are revealed by a variety of historical or allegorical clues. For example, the work might depict the filmmaker's political aim to perform the broadcast function as a moral duty enacted against hostile agents attempting to conceal the traces that the documentary attempts to broadcast (e.g., corporate executives trying to cover the facts; surveillance police in Taiji in *The Cove* etc.).

Because they use recorded traces of facts, these works provide the appreciator with means and incentive to enquire about the depicted historical crises (*Minamata*), social unrests caused by pollution crises (*Minamata*), and intimacy with the anguish of victims of environmental crises (*Minamata*); climate change induced by human activity in *An Inconvenient Truth* (and many other environmentalist documentaries); or the slaughtering of dolphins in Taiji (*The Cove*); and so forth (see Table 1 for additional examples).

Concluding remarks

In this paper, we have expanded the psycho-historical theory of art and art functions to expound how artists working in environmental arts can operate as agents of mental, historical, and political change. To contribute to political change, artists can contribute to the public's awareness of environmental crises, to the public's emotional sensitivity to the consequences of such crises, and to the elicitation of the public's thinking about political action in the environment. If combined with adequate scientific understanding, the artist's ability to elicit reflective thinking might even contribute to eliciting an awareness of *biases* in the human cognitive and emotional assessments of environmental challenges. We do not claim that the chief function of environmental art is to provide knowledge in the way of science, namely because emotional responses do not have the same status in the arts and sciences. However, we suspect that works of environmental art can be combined with scientific surveillance to elicit broadcasting procedures that elicit emotions, motivate critical thinking and political action about environments.

Table 1 A psycho-historical account of the core functions of environmental artworks

Environmental works of art (chronological order)	*Possible broadcasting and surveillance effects*	*Possible emotions-manipulation effects*	*Possible explanation-triggering and refection-inducing effects*
4'33" (1960), John Cage	To broadcast the sonic environment of the performer and listener in the context of the performance	To generate emotions by violating expectations associated with a musical performance; to provide motivation for an open conception of the arts	To trigger elaborations on the context-specificity of the work and of the norms associated with artistic performances
Minamata (1971) by Tsuchimoto	To broadcast the ecological and political environment of the Minamata crisis; to present intimate portraits of the victims	To trigger empathy with the victims and anger at agents attempting to conceal the crisis and silence the victims	To triggers the appreciator's critical reflections on the management and policies on environmental crises
Koaanisqatsi: Life out of balance (1983), Reggio, cinematographic work	To broadcast the dramatic environmental changes and hazards resulting from anthropic activities in the twentieth century	To trigger awe and, perhaps, fear of certain anthropic changes; to provide motivation for environmentalist actions	To elicit critical evaluation of dramatic environmental changes
My Things No. 5-5000 Pieces of Rubbish in 2002 (2002), Hong Hao, colour photograph	To broadcast the massive production of rubbish as a consequence of consumerism in China	To trigger surprise and, perhaps, fear of the consequences of consumerism; to motivate a change in consumerism habits	To raise awareness and question the globalisation of consumerism
Mountain Patrol (2004), directed by Lu Chuan, fictional film	To depict the violence and greed of poachers involved in illegal hunting of precious animal furs	To trigger sadness and anger at the slaughter of nearly extinct species and respect to agents who attempt to prevent illegal hunting	To triggers elaborations on profit-making on the basis of poaching and the challenge of protecting endangered species from human greed
Waste Not (2005), Song Dong, installation	To broadcast the differences in consumption patterns between generations	To elicit respect, empathy, and filial piety to the artist's parents and the anti-consumerist attitudes of the artist's mother	To induce reflective thinking on the stark contrasts between the consuming patterns of different generations (esp. in recently developed countries)
Manufactured landscapes (2006), documentary on E. Burtynsky's work directed by Baichwall	To broadcast environmental changes and issues associated with economic development in China	To elicit a variety of emotions such as awe, surprise, and fear	To induce reflective thinking on environmental issues, economic growth and human rights in China
Crude (2009), directed by Joe Berlinger	To broadcast the pollution caused by oil drilling in the Amazonian rainforest and a class action lawsuit against Chevron Corporation in Ecuador	To elicit empathy with indigenous people who suffered from oil pollution and anger at the indifference and concealment of the crisis by Chevron Corporation	To induce reflective thinking on the relationships between the environmental predation by multinational oil companies
No Impact Man Documentary (2009), Colin Beavan, documentary	To broadcast the artist's self-promotion and self-guided experimenting of sustainable means of living in a consuming society	To induce a varieties of emotions (sympathy, anger, jealousy etc.) in response the self-imposed challenge and its familial consequences	To induce reflective thinking on sustainable means of living, consumerism, self-promotion in promoting sustainability
Petropolis: Aerial Perspectives on the Alberta Tar Sands (2009), Peter Mettler, documentary	To make visible environmental effects of tar sands industries visible	To induce awe and distress at the scale of the changes caused the exploitation of tar sands	To induce reflective thinking on the predatory exploitation of environmental resources
The Cove (2009), directed by Psihoyos, documentary	To document the slaughtering dolphins in Japan and the untold tragedies of the industry of exhibiting cetaceans in marine parks	To trigger compassion for non-human animals, anger at the perpetrators of the slaughter, sympathy for the team of activists; to motivate environmentalist activism	To induce reflective thinking on the predatory exploitation of marine resources and a variety of other environmental issues
Waterlife (2009), directed by Kevin McMahon, documentary	To broadcast the problem of water pollution in the Great Lakes	To trigger surprise at the changes in landscape, and perhaps fear at their implications; to motivate environmentalist activism	To induce reflective thinking on the specific environmental issues of water management
Water Drawings (2009-2011), Blue Republic, digital colour prints	Surveillance and consumption of nature	To trigger surprise at the presence of barcodes on rocks	To induce reflective thinking about the predatory consumption and surveillance of nature and its industrial scale

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4. THE NATURE OF MYTH: A SYSTEMS REMEDY?

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Abstract

The term 'Balance-Unbalance' sings of the unknown world before us, one that will be shaped by the perturbation we are currently experiencing across multiple systems. "As we extinguish a large portion of the planet's biological diversity, we will lose also, a large portion of our world's beauty, complexity, intellectual interest, spiritual depth and ecological health" (Quammen cited in Tennyson & Martinson, 2006, p.1). This interdependency between cultural and biological systems decrees that ecocide is a matter for both our future nature and our future culture[s]. Thus as a priority, we need to strengthen and nurture relationships between our biological and cultural worlds. This is the function of mythology. "It would not be too much to say that myth is the secret opening through which the inexhaustible energies of the cosmos pour into human cultural manifestation" (Campbell, 1968, p. 3). But what does this mean for Western civilisation, a culture that has long renounced the language of myth? This paper explores this dilemma and concludes with a proposition that storytelling in the hands of the transdisciplinary artist, could be part remedy for ecocide. Systems thinking infers that crises are opportunities for transformation. With this reckoning, ecocide could be the catalyst for remembering, realising and regenerating our potential in reciprocity with a biodiverse world.

Keywords: Ecocide, complexity, mythology, relationships, storytelling, systems thinking, transdisciplinarity, transformation

Living Knowledge

The geographical correlations between "biodiversity hot spots and linguistically rich cultural areas" hint at untold complexities linking cultural and biological diversity (Nabhan, 1997, p.38). These links are recognised by UNESCO (2008) "as key elements in achieving sustainable development". However these links are imminently threatened by ecocide. Environmental authorities concur that ecocide is a collective entanglement as complex as the biological and cultural systems it affects (Hamilton, 2010, p. 162; Brocchi, 2008, p. 29). Professor Deborah Rose sees this peril as "multi species ethnography on the edge of extinction" (Workshop notes, November 19, 2010). I concur with Rose, we need to "disrupt, disassemble and re-imagine" our narratives in order to strengthen multiplicity (Workshop notes, November 19, 2010). We need strategies that take the crisis of ecocide and transform it into an opportunity for strengthening multi-system diversity. To this end, ecocide is the story of our potential in reciprocity with a biodiverse world and it begins long, long ago.

Mythology emerged contiguously with world cultures as a language for explaining universal phenomena in a way that connected people with their rites and responsibilities in the more-than-human world (Bidney, 1950, p. 19). I must clarify that I do not align with the Western Paradigm's pejorative view of mythology or *muthos,* as being "fictitious discourse" and a lesser knowledge than "reasoned discourse" or *logos*. I recognise mythology as our species' prime language for dialoguing with the dynamic energy of the universe and regard it as the first sustainability manual, unmatched in its propensity for connecting multi-dimensional complexity. This ecological view is vital in remedying ecocide because it acknowledges myths as living knowledge. Joseph Campbell explains it like this:

> Wherever the poetry of myth is interpreted as biography, history, or science, it is killed. The living images become only remote facts of a distant time or sky. Furthermore, it is never difficult to demonstrate that as science and history, mythology is absurd. When a civilization begins to reinterpret its mythology in this way, the life goes out of it, temples

> become museums, and the link between the two perspectives becomes dissolved (Campbell, 1991, p. 249).

According to Campbell (1991, p. 38) myths serve four functions:

- The Metaphysical Function: Awakening a sense of awe before the mystery of being
- The Cosmological Function: Explaining the shape of the universe
- The Sociological Function: Validating and supporting the existing social order
- The Psychological Function: Guiding the individual through the stages of life

These mythological functions connect us with our psychological, spiritual and physical potential by cultivating interwoven networks between biological and cultural systems. A prime example of this active connection can be found in 'the forest'. In mythology (especially European myths) the forest is where we encounter the dark underworld. This is the place the hero must journey to undergo transformation from innocence to maturity. "Entering the Dark Forest or the Enchanted Forest is a threshold symbol; the soul entering the perils of the unknown; the realm of death; the secrets of nature, or the spiritual world which man must penetrate to find the meaning" (Cooper cited in Fraim, 2001). The link between mythology and natural ecology is a cultural method for triggering each stage of our growth, thus sustaining our evolution in a more-than-human world. Consequently, this means physical deforestation heralds extreme environmental/biological loss AND the permanent loss of mythological portals for our imagination and psyche. Ecocide threatens diversity of both external and internal realms.

Robert Bly (1991) says mythology feeds our soul in the same manner as science feeds our brain. In Occidental cultures these two realms, myths and science, developed in tandem and gave us an unprecedented understanding of the world and our place in it. However the dialogue between myth and science ceased at the time monotheism took hold and from 800AD the mythological era collapsed (ibid.). This is a significant point in seeking to remediate ecocide - mythology has been 'frozen' in the West while science has been rapidly advancing since the time of Galileo:

> We are now in a state in which the advances of the nuclear physicists and the subatomic physicists have given entirely new views of what is going on […] It can be said that the cosmology is going faster and faster and the mythology is falling farther and farther behind […] it means the soul is falling farther and farther behind. The brain is picking up the new cosmology and the soul is being given old texts which have not been rewritten (ibid.).

Possessing active mythologies is vital to our evolving relationship with the more-than-human world but with mythology frozen out of modernity we have no myths that can "address the realities of contemporary life, particularly with regard to the changing cosmological and sociological realities of each new era" (Campbell cited in Wikipedia, n.d.). How then can we remedy ecocide when it takes tens of thousands of years to birth new myths? We strengthen our storytelling.

Descending from mythology, storytelling is a ubiquitous sense-making tool that cultures have used since the beginning of time to warn and to guide (Edgecomb, 2011). Cognitive science ascertains that "stories are vital to us because the primary way we process information is through *induction*. Induction is essentially reasoning by pattern recognition" (Beinhocker, 2006, p. 126). Humans are highly proficient pattern recognisers and pattern completers (ibid., p. 127). We instinctively navigate the uncertainty of the present moment by metaphorically relating it to past experiences. Similarly, we predict the future by matching and superimposing previously learnt patterns. This is a unique human survival tool. "In the continually evolving world of complexity, the survival of any complex adaptive

system depends on its ability to recognise current conditions and implement behaviours that enable it to adapt appropriately […] for human beings, this capability arises largely from the ability to tell stories" (Baskin, 2005, p. 333).

The dominating stories of modernity, which we are bathed in daily, resound on a "patterning principle" that fastens the universe in linear, deductive narratives (Rozik, 2006, p. 552). These fixed narratives help to propagate authoritarianism and threaten our survival in a complex world because they "prevent adaptability" (Czarniawska cited in Boje, 2012). Fortunately, our collective imagination is not limited to these patterns and new sciences such as quantum physics, offer a means to stimulate our imaginations beyond the walls of classical thought. Quantum physics is an evolutionary leap in recognising pattern complexity and has thrust open opportunities for re-imagining our narrative structures using "complex, non-linear plots" (Merchant, 2003, p. 208).

Quantum physics intimates the universe is fluid (and not fixed) at a subatomic level. Scientists have observed solid matter turn into "wave-like patterns of probability" and they make a case that nothing can be understood as an "isolated entity" but only as a process of "interconnections and correlations" (Capra, 1996, p. 30). The quantum discoveries of the universe are not unique to science. Many cultures and some disciplines (like deep ecology) have their own languages for understanding the universe as a dynamic web of "interconnected and interdependent" phenomena (Capra, 1996, p. 7; Ntuli, 2002, p. 56). What all these different languages have in common is an ecological view of the world that conjures a paradigm of the relational (Pattern cited in Capra, 1996, p. 35).

Modern narratives are proving to be "too simplistic for living in the present global order", a world that is starting to show itself as the complex inter-connected network that it ecologically is (Gare cited in Merchant, 2003, p. 202). "In short, complexity needs to be investigated by means of a special, doubled mentality—a means of being fully attentive both inside and outside the unfolding phenomena - and Artists are potential leaders of research concerning this paradoxical capability" (Gibson, 2010, p. 7). The ability of creative practice to *experience complexity directly* is the same poetic valve that opens through mythology (ibid.). Thus I can see how the transdisciplinary artist and the traditional storyteller share a practice of illuminating the world (Prigann, Personal Conversation, 2004).

The Storyteller has traditionally held great responsibility to safely transport the listener between worlds, as Estes says "in dealing with stories, we are handling archetypal energy, which we could metaphorically describe as being like electricity" (Bly, 1991; Estes, 1992, p. 470). This is healing business, not entertainment. As we undergo an explosion of social media use, the function of storytelling is dramatically changing and "we're seeing a world where almost anyone can create a story and get it out to a potentially unlimited audience" (Jansen, 2010). While this could prove advantageous for nourishing collective diversity, "the explosive developments of computer sciences does not equate with a revolution in intelligence" (Nicolescu, 2002, p. 89). If our narratives remain predominantly anthropocentric and the customary knowledge of storytelling is forgotten, then the exponential rise in storytelling could help manifest ecocide rather than remedy it. As artists, if we truly want to strengthen cultural dialogue with the more-than-human world, so as not to "address environmental issues" but to open to "the potential of ecology", then we need to comprehensively understand the practice of storytelling in the wisdom of mythology and not simply as a sociological tool 155; (Haley, 2011, p. 3; Campbell, 1991, p. 122). This commitment requires that we:

- Tell ecological stories about plants and animals because we are losing this knowledge as "rapidly as we are losing endangered species" (Nabhan, 1997, p. 70).

- Know languages, both ancient and emerging, that connect us with a more-than-human world such as: biomimicry, deep ecology, quantum physics and mythology.
- Reveal patterns and their enfolding and unfolding relationships.
- Work with "the three fundamental characteristics of transdisciplinary attitude" which are: rigor; opening; and tolerance (Nicolescu, 2002, p. 119).

Transdisciplinarity disrupts a world built on classical thought by re-imagining space for the sacred and the other. It does this by sensing complexity, recognising unity in diversity, and opening to multidimensional and multireferential realities (Nicolescu, 2002. p. 89).). If we are to genuinely work toward re-balancing the inter-relationships between biological and cultural systems, then we need leaders who are able to truly dialogue between disciplines, states and species (ibid. p. 41). In the absence of mythology as our instructing living knowledge, society would do wise to equip top-level policy and decision management with Transdisciplinary Artists as advisors; and I am proposing this today as an action for funding an implementation. The crisis of ecocide will be our extinction or our opportunity for transformation. In the shadow of mythology, transdisciplinarity is good remedy for the future because it links culture, 'nature', "beings and things, at the deepest level" (ibid. p.89).

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5. FICTION AS A FORM OF CHANGE: A PAPER OVERVIEW OF A LITERATURE PANEL DISCUSSION

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Abstract

It is well established that literary work can promote insights that result in future change, whether on a personal or an institutional level. As Umberto Eco (1989) notes, the act of reading does not stop with the artist but continues into the work of communities. The papers delivered in this panel consider the regenerative role of literature within culture, arguing that the special properties of literature can convey an important sense of nature (Bateson 1973, Zapf 2008). These concepts are discussed in relation to writing about Australian flora and fauna. Using an ecocritical focus based on ideas about the relationship between literature and the environment the paper considers Australian works and the way in which literature enlivens this complex intersection between humans, animals and the environment. This engagement is investigated through three modes: the philosophical, the literary, and the practical. The novels discussed include Alexis Wright's *Carpentaria*, Richard Flanagan's *Wanting*, and Sonya Hartnett's *Forest*, as well as a range of fictional and non-fictional works that describe the Blue Mountains region in New South Wales. The paper closes with a discussion of the role of story-telling as a way of introducing the public to specific environmental locations and issues.

Keywords: Environment, literature, social change, ecocriticism, storytelling

Introduction

This paper will provide an analytical overview of the three papers presented in a collaborative discussion on literary work as enabler of future insight and change. After all, fiction is not simply an artefact of entertainment or an act of cultural mimesis. Literature can bring about actual changes, philosophically, creatively and practically. The notion of literary works as both presaging and transforming future visions is not limited to utopian genres. This paper concurs with philosopher Umberto Eco's assertion that the act of reading is a productive part of the artistic event; artwork does not stop at the work of the artist but continues into the work of the readers and communities (Eco, 1989). Readers' engagement with literature fulfils a regenerative role within culture; literary language has special properties that can influence the human sense of nature (Bateson 1973, Zapf 2008). This paper uses an ecocritical focus to explore various forms literary potential. Ecocriticism can be defined as "the study of the relationship between literature and the physical environment" (Glotfelty and Fromm 1996, xviii) and, although, ecocritics may take different approaches in their focus, it is this relationship between literature and environment that remains at the centre. This paper focuses on Australian literature, both the artefact and the presentation and reception of that artefact in community culture. It will suggest three ways in which Australian literary forms may enliven and augment not just our future engagement but the philosophical, aesthetic and epistemological tools we use to establish that engagement. This engagement will be investigated through three modes: the philosophical, the literary, and the practical.

Literature and environmental engagement: Three modes

First, we focus on the philosophical mode through the transformative potential in literary encounters with the non-human animal. Through a philosophical lens, Alexis Wright's *Carpentaria* (2006) can be

seen to suggest the import of human uncertainty and open mindedness in encountering animal otherness. The imagined, hopeful and alternative landscape of literature compels movement away from understanding the human/nature relationship as disconnected, adversarial or hierarchal.

Literature can work to destabilise the nature/human divide. Alexis Wright's ground breaking and deservedly lauded novel *Carpentaria* uses imaginative frames to *both* capture the ethos of a time *and* to imagine and shape a new (if uncertain) future and importantly, new (new for Western society in any case) ways for knowing nature. How to encounter the non-human animal in art? Animals in art are often reduced to crude anthropomorphic values, and animal imagery is often used to depict human qualities, often denigrating. But, as John Berger suggests, when we observe and turn our awareness to the non-human animal the animal may return the gaze and we may be aware of more complex connection separation, sameness, difference and otherness (Berger 1980 in Garrard, 2012, 152). The question is, how to ensure such encounters in art, that place of human consciousness change, is not one of violence or silence?

There are countless examples of the non-human animal returning the gaze and of explorations of separateness and sameness in *Carpentaria.* The very opening of the work involves a conflation of Rainbow serpent animal with landscape, seasonal change and Indigenous epistemology of knowing the rivers and seas:

> The ancestral serpent, a creature larger than storm clouds, came down from stars, laden with its own creative enormity. It moved graciously – if you had been watching with eyes of a bird, hovering in the sky far above the ground. Looking down at the serpent's wet body, glistening from the ancient sunlight, long before man was a creature who could contemplate the next moment in time. It came down those billions of years ago, to crawl on its heavy belly, all around the wet clay soils in the gulf of Carpentaria. […] This is where the rainbow serpent continues to live deep down under the ground in a vast network of limestone aquifers. They say its being is porous; it permeates everything (Wright, 2006, 1-2).

The novel takes as a given that the Dreamtime understanding of the serpent provides complex ecological understanding of the earth and its unpredictability. The rainbow serpent is both creative underground water source and deluge from sky. As Devlin-Glass has observed, Indigenous characters are able to predict the cyclone that ultimately destroys the town by 'recognising bat and bird behaviour as emissaries of a powerfully destructive Rainbow driven cyclone' (Devlin-Glass, 2008, 297). In the quote above the environment is given sentience through an animal embodiment, drawing on traditional Waanyi worldview. This sentient, but not always benign, entity 'permeates everything'. This includes human life, belying modernity's assertion of dominance over and categorisation of nature. Through such narrative construction it is impossible to determine character, action and setting as discrete elements of the text, nor is setting an inferior element to be acted upon, as has been the historical tendency in human perceptions of narrative (Buell, 1995).

The non-human other as a conflation of setting, character and plot in the form of the Rainbow serpent provides both a narrative foundation for the lengthy work and an evocation of Waayni worldview. But this text does not use this worldview as a thematic subject. It is, in fact, a given. The Dreamtime illumination of the earth is juxtaposed with vernacular and quotidian observations of modern existence if the Gulf. More importantly, Dreamtime knowing is implicitly linked to ecological epistemology (Devlin-Glass, 2008, 395). Such Indigenous knowledge is compatible and congruous with western ecology and both come from an entrenched engagement with and observation of the natural world. The unification of 'scientify' (to borrow the text's idiom) knowledge and Indigenous knowledge in the novel fully engages with the modern environment; it is not only an explicating of the past. The epic tale imagines not so much a future, as a future *way* in which we might unite epistemologies to know our present condition.

The novel's representation of feral *and* native animals within the text is a patterning of human connection and humble human confusion in the encounter with the animal. These narrative complexities of the work enable readers an opportunity to see that the literary text can 'save the earth by disclosing the non-equation of the word and thing, poem and place' (Rigby 2004, 437). That is, the art work announces and accepts human incapacity to fully know and represent the non-human realm.

Carpentaria helps to imagine new futures or new epistemologies where we may open ourselves up as respondents and collaborators with nature rather than active controllers of the natural realm, whilst acknowledging the anthropocentric limits of our capacity to *know* nature. These themes are expanded on in the full panel discussion.

Next, this paper takes moves from the philosophical to the literary and examines two Australian authors who shift the boundaries of conventional writing. While setting has always remained the poor sister of the other narrative conventions of character, plot and action, there are authors who are addressing this and opening up the dialogue of possibilities.

One of the advantages of fictional writing is that even though it may have conventional forms and structures, fiction is free from many of the constraints and restraints of everyday language. Because of this flexibility, fictional writing may be a way to challenge our expectations of Earth and provoke new understandings of Nature. The texts chosen for discussion are Sonja Hartnett's *Forest* and Richard Flanagan's *Wanting.* The work of both of these writers goes further than having the landscape as backdrop or animals as merely sidekicks aiding humans and instead is imbued with an overall green consciousness.

This green consciousness takes up the ideas expressed above and develops possibilities that may occur when stories move beyond structures of binaries and, rather than always being subjective, become inter-subjective. These novels, although very different in theme and motive, are both driven by a desire to change and to allow the space for different stories to be heard. Fictional writing may play a vital role in shaping and managing our future and help us in moving forward to new understandings of place and identity. These authors have used a number of literary techniques in their work that may enable these new imaginings spaces to emerge and be heard. Hartnett uses alternative viewpoints and takes the power of language away from humans. Once she does this their authority and decision making is no longer seen as legitimate and dominating and becomes one voice among many. Flanagan uses different literary techniques to push through conventional narrative structures. His work is truly inter-subjective with no one voice, place, history or story taking centre stage.

One of the growing areas of interest in eco-criticism is the way literature can be used to change perception and move through past limitations that have aided in the continued barriers that are placed between humans, animals, and the environment. Helen Tiffin, one of leaders in this field says, "what is probably most needed is not the capacity to think beyond the human, but the courage to imagine new ways in which human and non-human societies, understood as being ecologically connected, can be creatively transformed" (Tiffin, 2010, 215). Lawrence Buell finds that there may be a way to move forward and transform our understandings but it requires a shift in the way we actually read a text. This may sound a simple task; to read differently. However, as Buell makes clear, our reading strategies are based on long standing literary conventions. Buell says there must be an "upending (of) a traditional quasi-Aristotelian fourfold framework for reading literature (plot, characterisation, theme and setting)" and there is a need to refocus our frameworks of reading around setting, the element most often neglected in Western criticism (qtd in Payne, 206). Writers have often neglected place. They may give brief descriptive passages but only as a way to get into the more important story about the human characters or if setting is described it is used as the backdrop for the human action to occur. Setting may also be used in a thematic sense but once again it is used to explain character development or motivation. The emphasis of the story remains; character, plot, theme and setting is added to accommodate and accentuate these dominant three. This is not to suggest that writers and readers are doing this in a deliberate sense, but more that, many writers and readers have not yet incorporated a green consciousness into their meaning making processes—the idea that the environment can be part of our imaginings. Our imagination needs to undertake a process of regeneration. However, how this regeneration is to occur is not immediately identifiable.

This panel looks at how regeneration may be possible, not just in a philosophical sense, or an imaginative sense but also in a practical sense—to be applied and lived within the everyday world. In so doing, this panel paper ends with a discussion of the intersection of the imagination and the natural world in the context of designed exhibition spaces, whether they are called heritage centres, museums,

cultural centres or art galleries. Given the growing emphasis on such centres as a way of introducing the human to the non-human environment, storytelling fulfils an important part of the process of public consumption because the displays inevitably refer to the stories from a region, whether literary or vernacular, and to relationships with landscape and animals expressed in those stories. Yet often fictional (and non-fiction) writing is subsumed in newly designed centres in favour of stunning visual representations, recorded oral histories, or geo-cultural data. The visual and oral accounts are undeniably important but history tells us that it is often the imaginative stories that have worked powerfully over centuries to create links between human and non-human worlds.

With a re-orientation towards the literary it is possible to use digital technology to foreground narrative as part of the engagement, education and nostalgia that form the basis of today's experience economy that features in exhibition design (in which the 'experience' is the focus of much social, economic, and cultural activity).

The Blue Mountains Cultural Centre, which opened in Katoomba in November 2012, offers an interesting case study of the new ways in which the public experience local and regional narratives. This discussion considers both fictional and non-fiction representations of this environment, selected on the basis of writing that has been acknowledged in the World Heritage Exhibition which is an important part of the new Cultural Centre. The Exhibition, called 'Into the Blue' is a drawcard. Billed as a'high-tech interactive exhibition that explores the natural as well as social landscape of this unique area' audiences are invited to 'navigate their way through these stories through an immersive exhibition experience, introducing them to the richness and wonders of the Blue Mountains World Heritage area.'

The juxtaposition of human-landscape tensions is evident in the work of the list of writers featured in the Heritage Exhibition. Diarist Elizabeth Hawkins' 1822 work drew attention to the terrors of the land and the difficulty of the mountain crossing; Charles Darwin's 1836 appreciation of the wilderness beauty was overtaken by his aversion to the colonial society of New South Wales; and Eleanor Dark's book *No Barrier* (1953) followed the colonial road building effort of 1813 which ignored Indigenous occupation and knowledge of the region. In 1931 the renowned conservationist Myles Dunphy had acknowledged a general attitude of hostility towards nature. "In destroying bushland we destroyed part of ourselves", he stated (26). And yet he envisioned a limited and specialised use of the forests by bushwalkers. His writing pointed to the romantic associations of writers and landscapes: he said that much of the government map-making of the period "killed much of the romance of penetrating rough scenic country hitherto unmapped" (84).

Writer Martin Thomas is not represented in the Exhibition, but his reading of culture, myth and landscape in *The Artificial Horizon: Imagining the Blue Mountains* (2004) offers an interesting perspective on such tensions. Thomas says the sense of a 'vertiginous terrain' remains domain in popular imagery, 'highlighting the aura of sadness, danger and imminent death' (26) as expressed by Delia Falconer in her Katoomba-based novel *The Service of Clouds* (1997). He says the Jamison Valley is itself an amphitheatre, a place of performance in which the "experiences and anxieties of a community, and especially the tensions concerning its relationship to country, could be enacted, remembered, inscribed" (164).

Poet and essayist Mark Tredinnick, who is acknowledged in the Exhibition centre, is well known for his 2009 work *Blue Plateau: a landscape memoir* in which he expresses similar concerns about public consumption of the Blue Mountains environment. This work is a creative response to the generations of black and white inhabitants in the mountains and is organized along geographic and climatic principles: valley, river, catchment, escarpment, pasture, fire, home. His epilogue resonates with the theme park sentiment of earlier authors:

> It was not landscape itself that I fell out with, not those two valleys, and my home ridge and Henryk's ridge and the river, which is the author of us all; no, but the towns and suburbs, which sit upon that parlous ridge with so little grace, aghast at what surrounds them. Les said in his old age that Katoomba had become nothing but a tourist attraction. And I think he's close to right. The place is a tawdry theme

> park, perched in an astonishing terrain. Some find beauty in the dissonance, but it palled on me (231).

These ideas are interesting in relation to the responses of visitors to that Centre. To date, visitor feedback has argued for a greater acknowledgement of the authors in the region, including filmed interviews and more access to their works and their writing on the landscape. A general query is over the 'lack of chairs' in the Exhibition space, as visitors obviously want to have the time to sit and view the interactive exhibits and take in further fictional and non-fiction material as well as visual experiences.

This type of response is typical of a growing reader/audience demand for greater engagement with exhibited material and in part reflects the expectations of today's digitally proficient cultural tourist—a term that covers a visitor from another country or another suburb. Many visitors seem ready to take up the idea of co-creation, a concept proposed by Boswijk, Thijssen and Peelen (2007) to describe a way of integrating social or cultural experiences with a user's personal values, aspirations and demands. Our research shows that there are ways to use digital formats to engage visitors and allow them to feed back their experiences to the interactive site.

Digital representations of Indigenous culture and history have been very successful in the past decade and the inclusion of references to Indigenous fiction, such as *Carpentaria*, in this mode would offer new avenues for co-creation and the growth of valuable archives. If the natural amphitheatre of the Jamison Valley, as described by Thomas, does move indoors, one could argue that the shift may only generate a complementary version of the imaginary experience that writers have long celebrated in their written work. But the fictional world can be brought to a wider readership through the interactive engagement in public spaces. The expansion of new modes of digital delivery can be a part of the provocation of new understandings of Nature that we find in the writing of Flanagan or Hartnett.

Conclusions

Literature raises questions and leaves us in a space of productive movement towards a future, positioning us on the brink of change not mired in fixed outcomes and the past. This paper provides a critical overview of a more lengthy panel discussion where eco-critical approaches are applied to literature and humans engagement with literature as a mean of social change. In terms of our future engagement with the environment, the theoretical vantage point of ecocriticism identifies fictionalised redress to the non-human as backdrop setting, antagonist to human action or divided from human life; positions which have been dominant Western literary traditions (Plumwood 2009, Buell 1995 and 2006, Glotfelty and Fromm 1996, Kerridge and Semmels 1998). In this paper we have looked at how shifts can occur in our epistemological framings of knowledge, as well as our modes of creative writing and finally how to implement these changes into a lived experience. Our thoughts, our writings and our travels are all closely interwoven and impact upon one another. Writing is not static. It is an organic and changing process that reveals and opens up alternatives and possibilities.

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6. CONNECTING TO PLACE: CREATING WEB STORIES TO ILLUSTRATE THEN, NOW AND NEXT

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Abstract

Today's learners are often described as the 'connected' or 'digital' generation, however it has been reported that these learners are harder to engage in classroom learning due to the disconnected learning approaches still being used in our schools. A key educational goal for young Australians is that of becoming active and informed citizens, as such, this requires connection to place. If our learners are to become active and informed citizens they will be required to investigate, inquire and create solutions for our present and future world by engaging in authentic learning. Learning about history does not always occur through authentic approaches, however history which connects to place through the use of digital resources, has the potential to engage our learners in local and global learning. This paper explores the use of a 'web-story' to connect 21st century learners to place and engage them in investigating the then, now and next. As a digital tool, a web-story can act as an engaging resource made by the teacher or be generated by the learner as a learning task. The web-story provides the opportunity to construct a story about the past, make links to and offer solutions for the present and identify issues for the future. As such, web based digital resources and links would be embedded within the web-story to provide perspective, inquiry and debate. This paper will firstly explore the concept of a web-story and will examine ways in which history can be explored through a web-story. Examples of web stories will be provided along with contextual factors that should be considered when designing a web-story.

Keywords: Place, pedagogy, web-story, learning, history, digital learners

Introduction

Every ten years key education policy makers meet to discuss and decide upon the future educational goals for young Australians. One of two goals identified in the Melbourne Declaration in 2008 focused on learners: "that all young Australians become successful learners, confident and creative individuals and active and informed citizens" (MCEETYA, 2008, p.8) This paper focuses on one component of the above goal, that of our young Australians becoming 'active and informed citizens'. There are many components to becoming an active and informed citizen. Some of these components include becoming responsible local and global citizens, acting with moral and ethical integrity, relating to and communicating with others from different cultures, participating in civic life and to "work for the common good, in particular sustaining and improving natural and social environments" (MCEETYA, 2008, p.9). Thus the relationship in which we develop with our environment and the world becomes a driving force in the type of citizen we become. According to Clarke (2012), it is the awareness of the interconnections between natural and human systems that will stimulate the way we live and act in our future world. This paper examines a teaching and learning approach that embeds the notion of active and informed citizenship through the use of a web-story. The approach provides opportunities for learners to make connections between natural and human systems in order to adapt our actions to those that reflect care for our environment. Within this paper, it is proposed that in order to become active and informed citizens, a connection to place must first be achieved.

'Place' can be broadly defined as a location, residence, habitat, zone, region or area. This paper focuses on how learners can connect to 'place', thus we are investigating the attachment and association people have to a habitat, an area or location. Place comprises of animate forms, some of which are human, along with inanimate forms (Everett, Noone, Brooks & Littledyke, 2009). There is a relationship between all forms and all forms exist in relation with each other. According to Everett et

al. (2009), in order to understand and build our relationships with place, we firstly need to understand the effects we have on our place. This applies directly to learners, and accordingly the past and present experiences we have had of different places provides learners with a sense of place and enables them to make connections to it (Everett et al., 2009). Clarke (2012, p.124) states that to be connected, the learners need to identify "relational patterns that inform change, from local to global, from individual to group, from living being to planet, from past to present to future, from micro to macro, from collective to self, from real to virtual". Hence we need to learn about place, be aware of the features that create a place and make it unique, as well as the relationship between those features (Everett et al., 2009). Developing explicit connections with place involves firstly the acquisition of factual knowledge, secondly the transformation of knowledge and finally the application of knowledge in order to know a place. An approach traditionally used in environmental education achieves a similar outcome in learning about place and sustainability: about, for and in. Within the context of this paper, this equates to learning *about* the environment, learning *for* the environment and learning *in* the environment (National Curriculum Council, 1990).

In order to outline how we can develop our young Australians into active and informed citizens who connect to place and care for place, this paper firstly explores the current state of the curriculum in Australia and how this impacts upon the focus of connecting to place. The paper then investigates who the 'young Australians' are that the curriculum is catering for, their characteristics and how we should be engaging them in learning. The concept of a web-story is then explored and an example of a teacher developed web-story is described and presented. The paper concludes with final thoughts, which summarize the key messages from the paper.

Active and informed citizens in the curriculum

Much change has occurred in education in Australia in the past few years, particularly in the area of curriculum. The 2008 Melbourne Declaration on Educational Goals for Young Australians was the starting point for some of this curriculum change. In 2013, we are in the midst of implementation of implementing a new national curriculum. The move from seven individual state curriculums to one national curriculum is a revolutionary change in Australia's education system. Traditionally, the creation of active and informed citizens who sustain and improve natural and social environments would have been left to the humanities disciplines in schools. Prior to the national curriculum, the key learning area of social studies in the primary school and the subject of geography (among others) in the secondary school contained elements that promoted development of such citizens. However, the introduction of an Australian curriculum provides further opportunity for the development of active and informed citizens as shown in Figure 1. In particular the Australian curriculum has separated the humanities disciplines into specific subjects areas in both the primary and secondary school years and has introduced 'cross curricular priorities'.

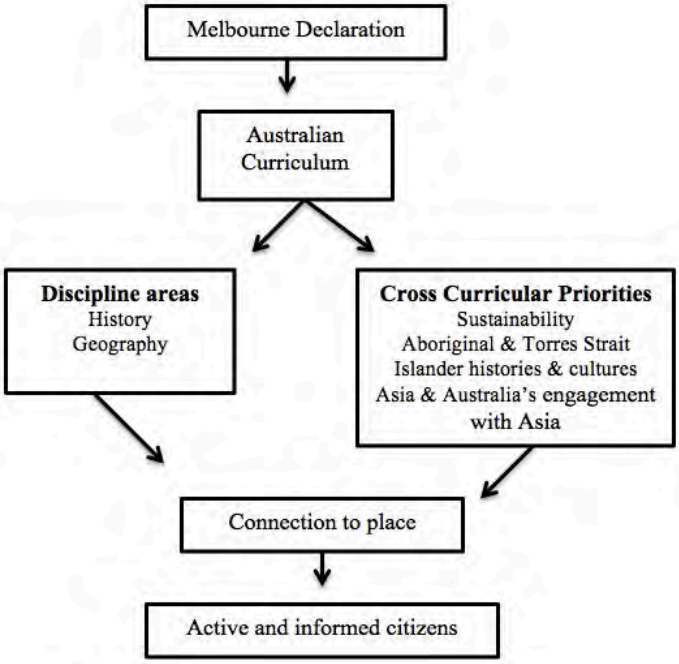

Figure 1. Curriculum links to active and informed citizens

As shown in Figure 1, history and geography are now individual subjects in the primary school rather than being combined as social studies. Both history and geography will be studied by every learner from foundation year until year 8. The addition of three cross-curricular priorities provides an emphasis of specific contemporary learnings embedded within the curriculum that young Australians should learn (ACARA, 2012). The cross-curricular priorities are sustainability, Aboriginal and Torres Strait Islander histories and cultures, and Asia and Australia's engagement with Asia. Each of the three cross-curricular priorities have specific links to place. The concept of 'place', as it was defined earlier is traditionally studied in geography. However, history also considers place as a key concept when exploring characteristics of society, events, movements, and development. As geography and history are to some degree specifically linked to 'place', each of these disciplines will now be examined according to what they focus on and teaching approaches utilized.

The discipline area of geography can be described as the 'why of where' (ACARA, 2011). Geography focuses on places and the people who inhabit those places. In particular geography focuses on features of places, how places change, how places are different and what the impact of the people within those places is (ACARA, 2011). Thus, geography encompasses the local and the global. According to Kriewaldt (2012, p. 21), education in the discipline of geography is as important as any other discipline area in that it "makes a lifelong contribution to the individual understanding of the Earth's natural and built features and the environmental, social and economic processes that change them". Teaching approaches in geography have moved from a teacher-centered chalk and talk approach to a more student-centered approach that encompasses inquiry learning (Taylor, 2012). Inquiry based learning in geography is described as an active approach to learning that embeds questioning at all stages of the learning cycle (Kriewaldt & Boon, 2012). An inquiry in geography would pose a question (which may be problem or issue based) and provide opportunities for the learners to explore the focus of the question, collect and analyse data, explain their findings and make connection to their own understandings. An inquiry would then finish with an action of some sort that may be as simple as communicating their understandings or developing a solution to the issue.

History, as a discipline area, develops our knowledge and understanding of the past in order to move into the future. History according to ACARA (2013, p.1) is:

…a disciplined inquiry into the past that develops the students' curiosity and imagination. Awareness of history is an essential characteristic of any society, and historical knowledge is fundamental to

understanding ourselves and others. It promotes the understanding of societies, events, movements and developments that have shaped humanity from earliest times. It helps students appreciate how the world and its people have changed, as well as the significant continuities that exist to the present day.

The teaching of history in the school setting sees one of three 'conceptions of history' being utilized, namely grand narrative, new history and critical history (Hart, 2011). Grand narrative history was the accepted method of teaching history in the nineteenth and twentieth century. It presented history as accepted and unquestioned stories about the past. Grand narrative history was a one sided version of the past which was often taken as the truth about an event or people (Hart, 2011). A prime example of grand narrative history was that of the discovery of Australia. The nineteen eighties however saw the introduction of 'new history' which looks at the past, but examines the different versions and perspectives of the past. It was during the uptake of new history that the inquiry approach was introduced as a teaching method. The final conception, critical history focuses on the examination of various perspectives of the past in order to reconstruct these for the future. It also assists teachers in communicating the relevance and importance of history for young people (Hart, 2011). According to Reynolds (2009, p.98), "history stories help develop the historical imagination – a necessity if students are to work with events and ideas that happened in the past".

It can be seen that teaching approaches in both history and geography promote the use of inquiry. Inquiry, in any discipline area is primarily used as a way to engage learners in exploration and investigation into an issue or problem. Specifically an inquiry is authentic in context, relevant and guides the learners towards finding a solution (Ambrosetti, 2010). The disciplines of geography and history also lend themselves particularly well to the embedding of the cross curricular priorities, as many of the topics studied within these disciplines have specific links to sustainability, which in turn have specific connections to place. Issues that have links to sustainability are often considered as pertinent topics for learners to inquire about. Thus it can be seen from the following description from ACARA (2012, p.23), as to why sustainability was included as a cross-curricular priority:

Sustainability will allow all young Australians to develop the knowledge, skills, values and world views necessary for them to act in ways that contribute to more sustainable patterns of living. It will enable individuals and communities to reflect on ways of interpreting and engaging with the world. The Sustainability priority is futures-oriented, focusing on protecting environments and creating a more ecologically and socially just world through informed action. Actions that support more sustainable patterns of living require consideration of environmental, social, cultural and economic systems and their interdependence.

According to Tilbury (1995), relevance needs to be a central principle when investigating a concept such as sustainability. Specifically, she argues that if we are to interest and involve our learners in caring for place, whether this be local or global, then the learners must have opportunities to explore the connection between themselves, environmental issues and the progressive development of the world around us (Tilbury, 1995). Thus when studying sustainability through a geographical and historic lens two phenomena occur. Firstly, a distinct connection between the environment and its people can be developed followed by a connection about environmental patterns which can be shown between then, now and into the future. It is this phenomena that provides the basis for informed action to occur.

21st century learners

The learners in school today are often referred to as generation Z, the connected generation or the dotcom kids. Dotcom kids, as the name might suggest, are children who are digitally aware and technically able and have not known a world without technology. They are also visually oriented, globally conscious and are growing up in a world radically different from twenty years ago (Ambrosetti, 2010). This current generation who inhabit our schools are also described as over-stimulated and this can lead to difficulty when attempting to engage them in learning (McCrindle, 2012). However, this dis-engagement in learning can be linked to some of the 20th century teaching

methods and tools often used in the 21st century classroom. The learners of today are not the ones the education system was originally created for (Prensky, 2001).

Generation Z are often characterized by the ease of which they interact with the digital world (McCrindle, 2012). However there is more to a dotcom kid than just the way in which they engage with digital technology. Generation Z learners like a student-centered approach and like the opportunity to be 'hands on' in learning (McCrindle, 2012). Although they enjoy using digital technology in the classroom, they also like a multi-modal approach whereby more traditional resources and teaching methods are used. Many Generation Z learners like the opportunity to interact with their classmates during learning episodes; that is, they enjoy collaborative work where a group works together towards the achievement of a task. This generation has also been described as taking an interest in both global and local issues, and these include issues about the environment. According to McCrindle (2012), Generation Z are particularly concerned about issues of water, climate change and protection of environments.

When engaging Generation Z learners in both general learning and learning within the disciplines of geography and history, Tilbury (1995) identifies that the use of active learning strategies is key in ensuring a connected experience with sustainability issues with school-aged learners. In a context of a classroom, active learning strategies would include the use of games and role plays, as well as discussions that respond to stimuli such as artifacts, photos, media or personal experiences (Tilbury, 1995). Research undertaken by (Davis 2010) found that engaging learners with the environment through digital technologies provided a platform in which learning could occur and connections could be made. However Burke and Cutter-Mackenzie (2010) argue that learners also need to engage in authentic environmental experiences that are meaningful to them. As such, authentic experiences provide the learners with the opportunity to make connections to prior learning and interpret social and ecological events in order to further their understandings of environment and place (Burke & Cutter-Mackenzie, 2010). Using such a variety of strategies, resources and tools outlined here provides an opportunity for multi-modal learning that is interactive and includes preferred digital tools and learning styles of Generation Z.

A web-story – the what and why

There is no written definition of a web-story, however as the name implies it is a story that makes use of web resources. A web-story may be created in a wide variety of platforms from a PowerPoint or Prezi to a live website. In some respects a web-story has similar qualities to that of a WebQuest as in both approaches the learners interact with resources from the World Wide Web. However, there is an important difference between a web-story and a WebQuest. A web-story is not an inquiry as a WebQuest is, however, a web-story can identify and frame an inquiry and become a resource used within an inquiry. A web-story can also be fiction or non-fiction in nature. A web-story is generally one that is non-fiction but can be told in a manner that uses a story in which to tell it. A web-story also has multiple uses. It may be used by the classroom teacher as a resource for the learners about the topic to be studied. As a resource, it could be used as a whole class resource whereby the web-story is viewed together and the links explored jointly. It could also be used for independent learning where learners work individually through a unit of work and access the web-story when needed. It may also be used as an assessment task set by the teacher for the learners to create either at the end of a unit of work or as an on-going task.

The use of a web-story provides a link for engaging Generation Z learners in learning. A web-story is digital, providing the learners with a learning tool that they are familiar with. A web-story also targets the visual senses and provides the learners with opportunity to interact with the technology and other learners. As a resource a web-story can help to inform the learners about a particular topic or issue. However if it is used as a learning task that the learners create, a web-story can promote creativity. A story, whether told through digital resources or told aurally, can inspire curiosity and can lead learners

to valid interpretation of and enquiries about events, people and places (Jackson, Humphries, & Bracey, 2005).

The wide range of digital tools available both within schools and outside of school indicates that access to information and images (both fiction and non-fiction) is much easier than before. This makes the use of resources such as a web-story easier to create and access. The information (story and web links) in a web-story is also current, as opposed to the encyclopedias of the past that were often out of date as soon as they arrived in the library catalogue. The beauty of 21st century digital tools that schools have access to do not limit learners just to information gathering. Most schools now have access to programs that allow learners to create resources of many types in a range of spaces in which to record their idea and designs. All such digital tools contribute to heightened engagement and thus different forms of learning for our tech savvy Generation Z.

As shown in Table 1, there are six components of a web-story, four of which are related to the structure of the web-story and two of which are related to specific inclusions. There is no particular length of a web-story, however most web stories do not exceed 20 slides in a PowerPoint format.

Table 1 – Components of a Web-story

Structural components	1. Introduce the place and/or event (provide the context) 2. Provide a factual story which may be told using a narrative or timeline 3. Identify an issue 4. Pose a question for investigation into the issue
Inclusions	1. Images 2. Web links

Component 1

The introduction of the web-story should 'hook' the audience into the topic, thus the introduction should include an engaging title, image and background. Also included in the introduction is the presentation of the topic that ideally would frame the context of the topic and provide background to the story. The introduction of the web-story may occur over several slides or pages.

Component 2

Following the introduction the story itself would then begin. As such, using a new history or critical history approach, the story should be told through a variety of perspectives that provides the audience with an all-encompassing view of the topic. Each of the slides would contain web links where appropriate as well as images that help to convey the story.

Component 3

Towards the end of the story, an issue or problem should be identified that is authentic and relevant to the learners. The issue or problem that is identified needs to be one that the learners are able to contribute to or do something about.

Component 4

The final component of the web-story is the posing of a question that leads towards an investigation into the issue. A web-story should ask a 'big question', that is a question that encourages the learners to inquire about an answer or solution to an issue that is affecting a place. The question should be open ended and enable the learners to engage in an inquiry. The question should be relative, relevant, but critical and able to be answered after research.

Components 5 and 6

The web-story will also include images and web links throughout. The images will assist in engaging the learners, but they will also present further information (through visual means) that the learners then deconstruct in order to make meaning from. Thus the images may include real life photos, artworks, pictorial artifacts, posters and diagrams. The web links themselves provide sources of further information or may even include access to online games and quizzes, video clips, blogs, forums and images for the learners. Despite the wide variety of web links that may be included, it is important that the web links are age appropriate and easy to navigate.

Web-story example

The following web-story is an example that demonstrates the possibilities that such a resource allows. This example is of a teacher developed resource that is to be used as the platform for an inquiry into the local area. The web-story was created by the author and is representative of a web-story. The web-story was created for year 2 learners and three learning statements were identified from the history and geography curriculum that guided the creation of the web-story.

1. History Learning Statement: The history of a significant person, building, site or art of the natural environment in the local community and what it reveals about the past.
2. Geography Learning Statement: People are connected to other places.
3. Geography Learning Statement: The significance of an environment or place contributes to how it is used.

The web-story presented in this paper is entitled ‘The Story of the Glass House Mountains’. The title slide of the web-story, as shown in Figure 2, introduces the story through a visual image and the title, thus setting the scene for the audience. Remembering that the age group of the intended audience is approximately 7 years old, the text throughout the web-story is told using simple vocabulary appropriate for this age group.

Figure 2. Web-story title slide

Following the title slide, is the introduction to the topic of the web-story. As it can be seen from Figure 3, the second slide in the sequence provides the learners with general background information: the location, geology and importance of the Glass House Mountains. Contained within this introductory slide is a web link that leads the learners to a 'scenic' video that provides visual images of the Glass House Mountains region. As such, Slide 2 begins to set the scene for the learners.

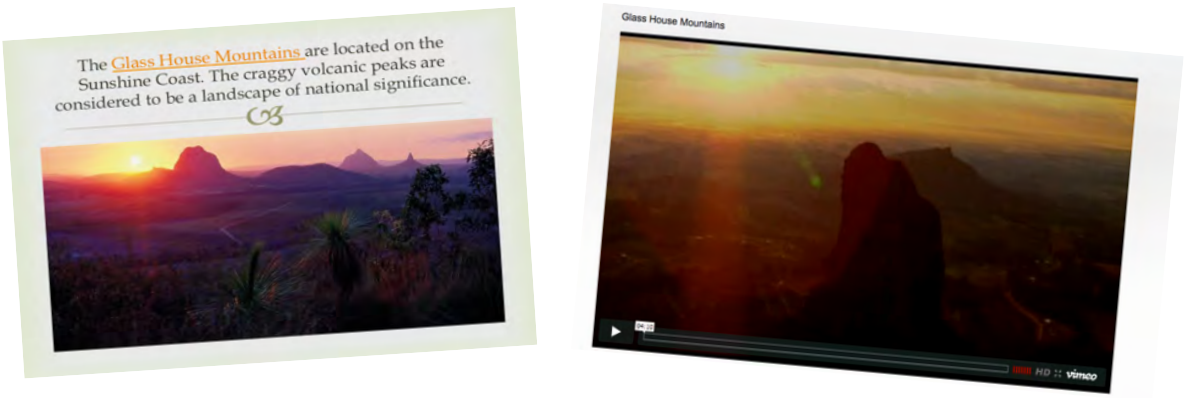

Figure 3. Web-story slide 2

Slides 3 and 4 continue to set the scene for the learners by providing information about the historic origins of the mountains. Two cultural perspectives are provided. Firstly slide 3 provides dialogue about the origin of the name of the Glass House Mountains, whereas slide 4 explains the link to local Indigenous culture. As shown in Figure 4, slides 3 and 4 also contain web links. The web link in slide 3 takes the learners to a children's website about Captain Cook who named the Glass House Mountains. Within this website, the learners can further explore the journey of Captain Cook as he travelled around Australia. This allows the learners to build some early knowledge around explorers. The web link in slide 4 provides the learners with the opportunity to find further information about the importance of the Glass House Mountains to Indigenous culture.

Figure 4. Web-story slides 3 and 4

After setting the scene for the learners, the web-story begins to explore the story of the Glass House Mountains in further detail. In this section of the web-story, a narrative is used along with a timeline of historic events and facts. Due to significant links to the Aboriginal people of the Sunshine Coast, this web-story recounts an Indigenous dreaming story. The dreaming story tells of how the mountains became positioned as they are now. The dreamtime story is presented on the next four slides of the web-story. Figure 5 presents the beginning slide of the story and also presents the web link embedded within slide 5. In varying the web links that are used within the web-story, the link embedded into slide 5 is a musical version of the dreamtime story.

Figure 5. Web-story slide 5

After the dreamtime story of the Glasshouse Mountains is told, the web-story then tells the story of development and 'progress' within the area. As shown in Figure 6, slide 9 sets the scene for this and uses a chronological timeline to document change in the area. A web link is not used in this slide.

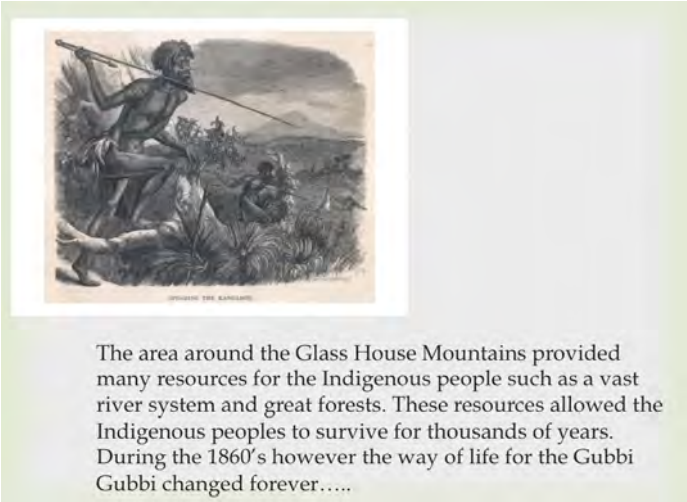

Figure 6. Web-story slide 9

The following six slides of the web-story document the development of the Glass House Mountains region through the use of chronology from the 1860s to the 2000s. Thus Figure 7 provides an example of two slides that occur in this sequence. Slides 10 and 11 show two events in the history of the Glass House Mountains region. The web links embed into the slides take the learners to a family story of settlement in the area and to a more detailed timeline of settlement.

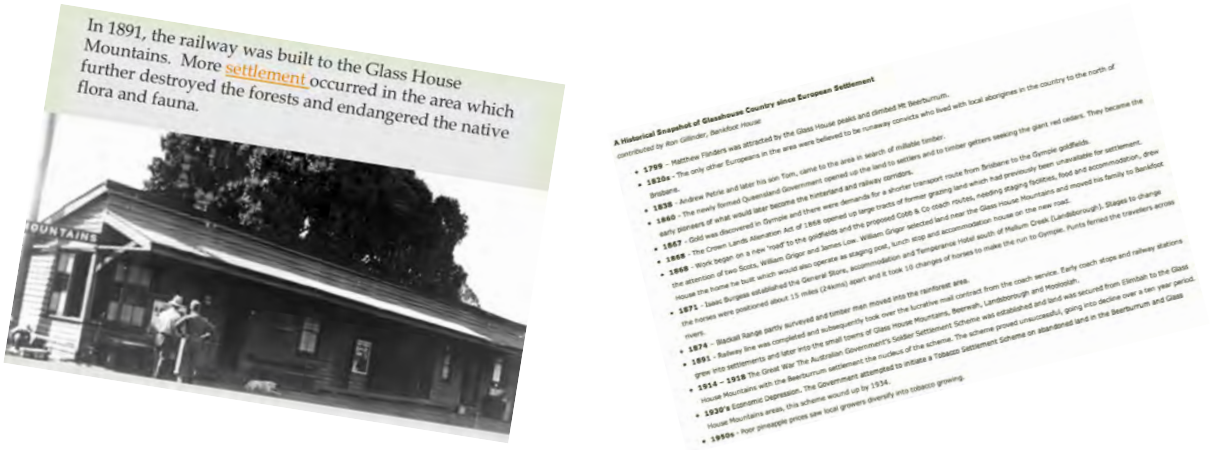

Figure 7. Web-story slides 10 and 11

Although slides 10 and 11 of the web-story communicate the history of the Glasshouse Mountains region, they also tell of the environmental damage done by settlement. Slides 10 and 11 are written specifically to convey a negative tone, however this negative tone is balanced with a positive tone in slide 12. It can be seen from Figure 8, that slide 12 also provides the audience with one perspective of a settlement's solution towards amending the environmental damage done by the past generation.

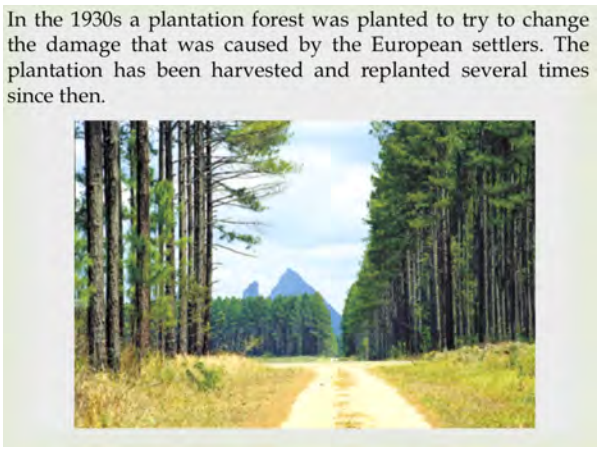

Figure 8. Web-story slide 12

As the sequence progresses towards the end of the story, the chronological timeline of the web-story brings the audience to the present day. As can be seen in Figure 9, slides 13 and 14 provide dialogue about how the area has progressed into the twenty-first century. Slide 13 presents the Glasshouse Mountains as a tourist attraction that is utilized for leisure activities and slide 14 provides information about local farming and shows industry in the region. The web links embedded in the slides provide

further information in the form of maps, visual images and facts.

Figure 9. Web-story slides 13 and 14

The final slide in the web-story leads to the inquiry. As shown in Figure 10 the final slide poses an investigative question for the audience. The question asked is 'How can we continue to enjoy the Glass House Mountains, but yet protect them for future generations?'. Once the web-story has been read and explored, the classroom teacher would guide the learners towards the planning of an inquiry that will answer the question posed.

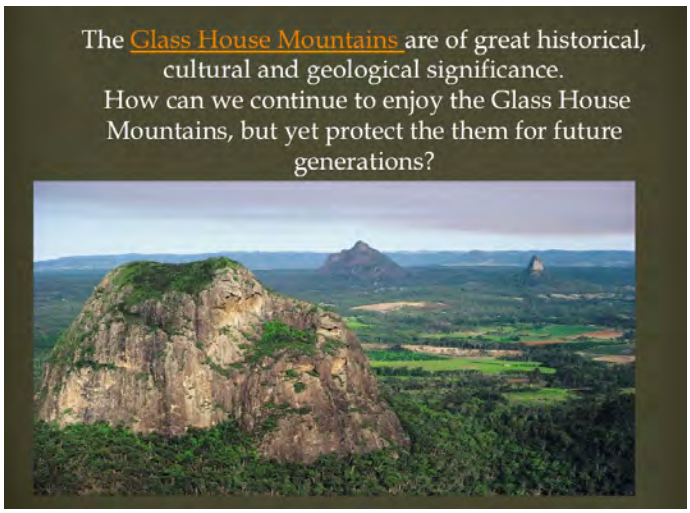

Figure 10. Web-story slide 10

The web-story that has been presented provides the learners with opportunities to further their knowledge and understanding of a local place. It also presents provides the learners with a starting point in which to make connections to place. People have had a particular impact on this place and the web-story affords the learners the opportunity to consider human action in relation to the creation of a sustainable future. It also encourages the learners to consider how their own actions can impact on not only this place, but others like it. The interconnections between natural systems and human systems emerge as the story is told. However, the web-story presents the learners with the option of developing their own conclusions about the place and how a sustainable future can be re-imaged for it.

Final thoughts

Key education policy makers in Australia have identified that an important goal of schooling is to produce students who are successful learners, confident and creative individuals and active and informed citizens. This paper has presented a digital tool that can engage our 21st century learners in learning about and developing active citizenship. This paper has also presented an approach which involves learners in becoming aware of place and how we can act sustainably towards protecting place. The digital tool presented demonstrates how we can engage learners in learning about place through exploration and discussion that targets values and attitudes towards sustainability (Littledyke, 2009). Clarke (2012) proposes that in order to solve issues within our communities we need to re-imagine our place. This paper has proposed that in order to sustain our environments we need to examine the past and present, in order to re-imagine our future places and become active citizens. The future is in the hands of our current generation – engaging them meaningfully in the topics and issues of today will create the problem solvers and decision makers of tomorrow.

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7. THE IMPORTANCE OF PERCEPTION TO ENVIRONMENTALISM

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Abstract

The importance of perception and cognition are integral to my research. This paper explores modes of perception from a cross-cultural perspective and shows instances where a changed perception of the natural environment can influence the overall protection of that same environment. Via my experience of the venerated Tree in India I argue that respect for the environment is strengthened by how we perceive the environment. I show that, through a changed perception of the Tree, society is able to protect the Tree, as it is no longer seen as an inert commodity. I contrast this with perceptions of the land in Australia and how inherited cultural notions of landscape have become deleterious to land management. How we perceive and contemplate the land affects how we treat the land, and ultimately how we live on it. We are less likely to honour and respect the land if we see it as separate from ourselves. This perception remains pertinent irrespective of how the land is ideologically managed across cultural divides.

Keywords: Perception, environmentalism, trees, symbol, aesthetics

Introduction

How do we imagine the future for human kind and can creativity help us to shape a society that is interconnected, not only with each other but also with the living planet. In Australia we have attempted to change the land to suit our inherited cultural notions of landscape. Over time this has become deleterious to the natural environment. The question now is how we can change this. The further we move towards accepting the land on its own terms, the greater will be our achievement in finding our true relationship to the environment.

I am interested in what ancient cultures can teach us about interconnectedness and how we can take this knowledge and forge new paradigms for the future? Via my experience of the venerated Tree in India I explore these questions and argue that respect for the environment is strengthened by how we perceive the environment. I show that, through a changed perception of the Tree, a society is able to protect the Tree. How we perceive the world, and how these perceptions dictate how we respond to the land, is the basis of the argument I am putting forward today.

The Symbolic nature of Images

> The nature of Visionary Fancy or Imagination, is very little known, and the Eternal nature and permanence of its ever Existent Images is considered as less permanent than the things of Vegetative and Generative Nature; yet the Oak dies as well as the Lettuce, but its Eternal Image and Individuality never dies but returns by its seed; just so the Imaginative Image returns by the seed of Contemplative Thought. (William Blake as cited in Cook, 1974: 7)

Many authors and artists have shown that respect for the environment is strengthened by the symbolic nature of images. William Blake (1757-1827), for example, understood the power of the imaginary. When he refers to the 'imaginative image' he is alluding to a special way of seeing and perceiving, one that displays a sense of poetry, enchantment and connectedness with the natural world. Blake's vision and artistry were shaped as the period we now call the "Age of Enlightenment" was ending, and yet his view was in stark contrast to the predominant intellectual and philosophical fashions of that time. Contemporary science reflects the more prevalent notions of the 18th-century Enlightenment,

which privileges a cult of reason, where the realm of the imaginary is relegated to an intangible illusion of reality: the unreal.

Prior to the 17th century the tradition of European thought tended towards a spiritual vision, enabling the medieval world to respond favourably to the beliefs of St Francis of Assisi in his connectivity with the natural world. In the late 16th and early 17th century Francis Bacon, advocating scientific control over the natural world, introduced a new mode of thinking. This vision was articulated as the doctrine of 'progress' by Bernard Fontenelle the following century and was realised through the industrial age of the past two centuries. It could be argued that the vision of industrial progress, more than any other single cause, has brought about the deterioration that is now occurring across the planet (Berry, 1988: xii).

This commitment to progress has not only led to the change of the functioning of human society, but to the deleterious change of the chemistry of the planet. We have altered the bio systems and have changed the topography and geological structure of the planet, structures that have taken hundreds of millions of years to bring into existence (Berry, 1988: xiii).

Nature, Aesthetics & Environmentalism

In the introduction to the book, 'Nature, Aesthetics & Environmentalism' Allen Carlson & Sheila Lintott state that the natural environment is more likely to be preserved by aesthetic rather than ethical values - or 'by beauty rather than duty' (Carlson & Lintott, 2008:1). They go on to state that a sound natural aesthetics is crucial to sound conservation policy and land management.

An aesthetically pleasing image of nature has the potential to change public opinion, which in turn can instigate change in governmental decisions. The damming of the Franklin River is one obvious example, where a photo taken by Peter Dombrovski was credited with swaying public opinion of mainland Australians to demand the preservation of this pristine wilderness.

Figure 1. 'Rock Island Bend', Peter Dombrovski

But is it possible to agree on a global definition of a sound natural aesthetic or a beautiful natural environment? Definitions of beauty are cultural. One culture's beauty can be another's kitsch, or even ugliness. Consequently how people define an aesthetically beautiful natural environment becomes crucial to sound conservation policy and land management.

Many populations around the world have inherited a cultural aesthetic that has become deleterious to the natural environment they exist within. In Australia the land has played the primary role in the defining of our cultural identity. For Indigenous Australians, the land has always played a central role in their religious, cultural and social life. European Australians have tried to create a variety of identities for themselves. For example early Australian (non-indigenous) artists naturally responded to the Australian Landscape from various European perspectives.

According to Ian Burns in his book "National Life and Landscapes – Australian Painting from 1900 to 1940",

> Over the past two centuries the landscape has been invented and reinvented many times, in the context of serving different cultural, social and political needs. (Burns, 1990)

Australian history has shown the landscape to appear and reappear as an extension of the European landscape, rather than as something uniquely Australian.

Figure 2. 'Pea Gathering', A.Dattilo Rubbo 1913

By the 19th and early 20th century the notion of beauty in relation to the land still tended towards the green fields of Europe. The gum tree was considered ugly and the land was referred to as monotonous, somber and austere.

Figure 3. Advertise Australia

In the post war era there was such sensitivity over what image of the land was being projected overseas that there appeared to be a prohibition on films or images that showed the severity of the drought of 1920. An exhibition of Australian art shown in London in 1923 showed pictures of fertile pastures, with no suggestion of land afflicted by drought.

Amazingly, in some of the most arid parts of Australia you can still find front yards desperately trying to emulate the aesthetic of a European garden. The following two photographs were taken in Broken Hill on the same day. One shows a lush green lawn that had been watered with town drinking water, the other shows the soil as it appeared naturally.

Figure 4. Broken Hill Garden. (Photograph taken by author)

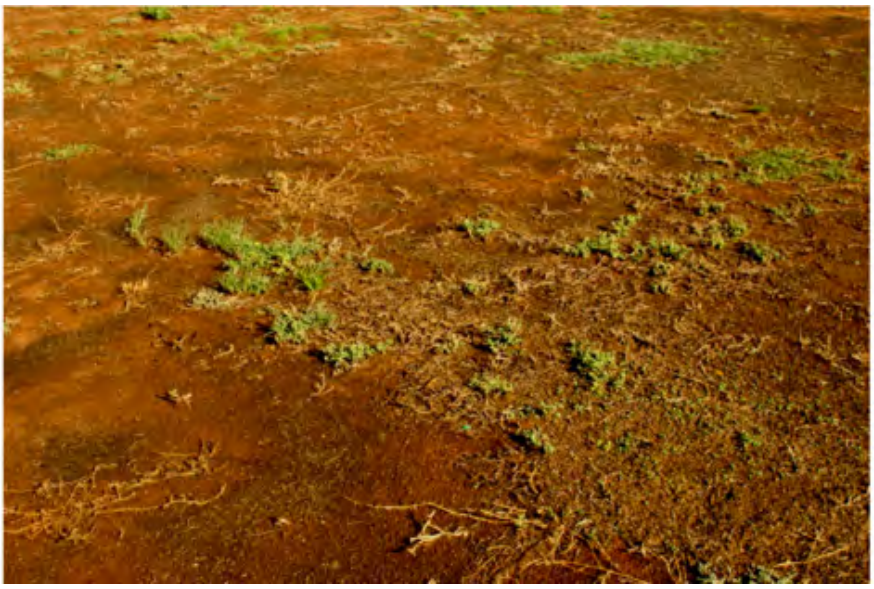

Figure 5. Natural land cover, Broken Hill. (Photograph taken by author)

Lucy Lippard stated in her essay, *Beyond the Beauty Strip* in Max Andrews *Land, Art – A Cultural Ecology Handbook*:

> Today- sparked by indisputable proof of human agency in climate change - the environment is in the centre foreground. It has become the radical edge. But the handle on that edge remains the land itself, how we see, understand, use and respond to it. (Lippard, 2006:14)

Lippard goes on to say that society produces our view of nature and that artists are complicit in the way the world is seen. In the late 1980's the art critic Peter Fuller recorded that he felt as though we lived in a world where art and nature had both "lost their meaning". The modern world had lost touch with ways of seeing, no longer encompassing archetypal myth, symbol and ritual, resulting, according to Fuller, in a "severing of connectedness" with the natural world (Fuller as cited in Cosgrove and Daniels, 1988:24). As we enter the twenty-first century this sense of disconnectedness has come to have dangerous implications for the planet. Our relationship with the land has deteriorated to a point where it is conquered, settled, farmed and mined. If we are to survive we now need a new vision to guide and inspire a fresh creative period that influences how we function and relate to the planet. We need to re-cognise the earth as a living reality, and reinvent our relation to the earth as a species.

One way in which we might achieve the change required is through examining culturally potent perceptions of land from across time and cultures, and investigate how the practice of certain belief systems have contributed to successful land management. My research into non-western land management has taken me to some fascinating places, where I have witnessed methods for protecting the natural environment that many in the developed world would consider primitive, or at least novel. One such practice is the veneration of the Tree. After travelling for the past ten years in India I have found that the practice of venerating the tree is still prevalent today. Most importantly I have found that when a tree has been venerated, or aesthetically enhanced, it is protected, thus making this practice an important environmental phenomena in today's environmentally challenged world.

The Veneration of the Tree as an Environmental Phenomenon.

Society today, particularly in the Western tradition, where technological advancement is elevated, tends to emphasise the rational, to give credence to reason and sense perception as primary modes of experience, thereby displacing imagination as a prominent mode of perception and cognition. This modus operandi has not always existed, however. Ancient cultures, whether monotheist or polytheist, acknowledged the sacredness of the land. An important aspect of ancient nature worship was the

veneration of the tree, and many cultures throughout history have revered trees. As a living organism trees became natural symbols. Considered sacred, trees were dutifully protected and nourished. Over time the belief in the sacred tree,

> … has left innumerable traces in ancient art and literature, has largely shaped the usages and legends of the peasantry, and impressed its influence on the ritual of almost all the primitive religions of the world. (Philpot, 2004: 1)

In the 19th century the scholar James Frazer became fascinated by the symbolic importance of trees in classical mythology and in numerous ancient civilisations and religions across time. He believed that all ancient religions originated in the personification of nature, which was evident in the practice of tree worship (Rival, 2001: 4).

The worship of trees occurred throughout Europe but declined with the rise of religions such as Christianity and Islam, which regarded such activity as pagan (Hageneder, 2000:56). In India, however, Hinduism accepted local cults, many of which worshipped nature. The early Hindu sacred texts, the Vedas and Upanishads, make frequent reference to sacred trees, referring to them as the most important living forms on earth, and reference is made to the divine quality of the natural world throughout these Indian scriptures.

Trees are symbols of vitality, welfare and well-being in both traditional and modern belief systems and, in Hindu thought, are believed to cleanse pollution and sin. With modernity considered to be the primary cause of deforestation in India, trees further symbolise anti-modern (anti-urban, anti-consumerist and anti-industrial) values and stand in opposition to manufactured objects, particularly to military armaments and cars, the symbols of death and decay (Rival, 1998:14).

Consequently, to this day Sacred Trees are found throughout India. They are worshipped by tribal animistic people and are considered the abode of the Gods by many other religions, including Hinduism, Buddhism and Jainism. Adherents of some of these religions began to decorate the tree as an aspect of ritual or veneration. This practice also enabled recognition of the sacred tree through its aesthetic enhancement.

Figure 7. Sacred Tree, Palani, Tamil Nadu, India. (Photograph taken by author)

Trees are decorated in India for a variety of reasons: historically they have been connected with rites of renewal, sexuality, fertility, conception, birth, initiation, wealth, death and rebirth (Cook, 1074: 105). People venerate a tree to pacify the tree spirits and to give offerings to the tree deities; to pacify an ancestors spirit; to commemorate a death or marriage; to achieve good health, healing or general blessings. Women venerate a tree in the belief that it will help them to find a husband or conceive a child, whilst farmers believe it will assist with the fertilisation of the land.

The historic and contemporary practice of venerating the tree through decoration has, over time, effected cultural change in India. The tree is perceived differently, it is seen as a form that houses the sacred, thus is protected. Even the most rapacious Indian businessman would not dare to cut down the sacred tree, which is recognised through its adornment (Fowler-Smith, 2009: 44).

To walk through the natural environment and stumble across one of these transformed trees can be a profound experience for the beholder. An experience that involves all the senses: it is a living art that is available to all (Fowler-Smith, 2009: 44). In this instance the artist is ‘effecter’, rather than ‘reflector’. When I came across a group of decorated trees at Palani in Tamil Nadu, I was immediately struck by their transformation. The trees, covered with golden yellow turmeric powder, broadened my perception of what was an otherwise normal grouping of trees set amid the bush land, to encompass a sense of reverence and enchantment.

Figure 8. Marriage Sacred Tree temple, Palani, TN. (Photograph taken by author)

At this nature temple, women come to perform a ritual in the wish for a husband. The ritual involves the gifting of small parcels of turmeric with notes recording their wish, or the name of the local deity. By adorning the tree in this way people are adding a value that is neither economic nor environmental, but aesthetic. This broadens the way society approaches the tree, with the aesthetic adding a sacred dimension. The decoration of the tree heightens the effects of the imagination and its perception, changing the cognition of the tree to the realm of the sacred.

Figure 9. Fertility and marriage Tree. Arunachala, TN. (Photograph taken by author)

In some instances the tree becomes an integral part of the temple architecture, literally growing though the structure, with its limbs perforating the roof, as in the next image.

Figure 10. Sacred Tree to the Traffic Goddess, Bata Bhuasuanhi, Orissa. (Photograph taken by author)

I discovered the Sacred Tree to the "Traffic" Goddess on one of the main roads leading out of Bhubaneswar, Orissa. Initially there was a small shop at this site, where people would stop to make a purchase, and then pray at the nearby tree for a safe journey. The gradual build up of gifts acted as a solicitation for the local priest to sanctify the tree, and eventually to the building of a small temple around the tree (Fowler-Smith, 2009: 45).

The banyan, pipal, neem and tulsi are among the trees and plants that all Hindus consider sacred. Other trees are only considered sacred in certain districts. Usually a reverential perception takes hold because a tree has a practical use in that particular region. The bamboo tree, for example, relates to the rice plant because bamboo flowers and bamboo shoots replace rice as the staple diet in times of drought. Ancient people worshiped the rice plant. Over the centuries, as the value of the bamboo in hard times became clear, people began to worship it because it served as an alternative to rice (Fowler-Smith, 2009: 45).

Figure 11. Sacred Bamboo Grove, Damanjoei region – Orissa. (Photograph taken by author)

Figure12. Sacred Bamboo Grove, detail

At this site countless terracotta pots, horses and an array of other paraphernalia had been left at the base of the bamboo and surrounding trees as gifts to the deity that was thought to reside here, Ma Kantabausani.

Figure 13. Sacred Bamboo Grove, detail

In country areas of Tamil Nadu it is possible to find life sized terracotta horses and figures placed in a decorative fashion at the base of trees.

Figure 14. Aiyanar attendants and horses, TN. (Photograph taken by author)

These are known as the Aiyanar horses and spirit attendants who ride with Aiyanar, the God of the natural elements and protector of the village boundaries. As a tradition of the ancient Dravidian religious system, the shrines are always found in rural areas and trees are an essential component

(Fowler-Smith, 2009: 46).

The Sacred Tree, as a signifier for renewal, may also be important in rituals pertaining to death. Hindus traditionally travel to the Vishnupad Temple in Gaya to honour their parents a year after death and to liberate the wandering souls to a more heavenly state of nirvana. The immortal Banyan tree, or Pinda Tree stands in the courtyard of the temple, which is where the final rites for the dead are held. According to legend the Buddha is said to have meditated under this tree (Fowler-Smith, 2009: 48).

Figure 15. The Sacred 'Pinda' Tree, Vishnupad Temple, Gaya. (Photo by author)

The Para Bhrama Temple at Ochira, in Kerala is renowned as a site of healing, where people specifically worship the tree. There is no actual temple structure, simply three very large decorated trees – one to Vishnu, one to Bhrama and one to Maheshera. Local legend states that the sacred trees represent the God Parabrahman – the God without form. This site is considered to be the Indian version of Lourdes in France (Fowler-Smith, 2009: 48).

Figure 16. The Para Bhrama Temple, Ochira, Kerala. (Photo by author)

I have found that, through aesthetic adornment the tree is transformed into a precious, sacred and living form in the eyes of the beholder. The sacred tree is perceived as a form that exists in both mythical and present time and that traverses the three worlds of the heavens, the earth and the underworld. Decorated trees act as a signifier, taking us back to an ancient form of visualization. Studies have also found that sacred Trees and sacred grove sites preserve old growth trees and forests, so are considered ecologically unique and important for conservation on varying scales of landscape, community and species. The fact that these sacred sites contribute to biodiversity conservation is an important point to be made.

Having travelled through ten states of India it became increasingly clear that decorating the Tree for the purpose of ritual or worship is widely practiced, with numerous aesthetic variations, throughout the country. It occurred to me that, as a non-Hindu/non-tribal, I too had started to perceive the tree differently, and it was the aesthetic enhancement that persuaded me to re-cognise these natural forms. This led me to the question whether it is possible for people outside of Hindu/tribal nations to inspire a re-envisioning of the environment through the aesthetic; and whether sacredness could be transferred through artistic vision without transplanting any specific religious ideology. Returning to Australia, I am reminded of an incident on my uncle's farm when he pointed to a group of trees growing on the edge of a paddock. He turned to me and said, 'gotta get rid of that vermin'. This comment has haunted me for decades. He perceived this lonely group of trees as vermin, in need of eradication. My experience in India has shown that, by perceiving the Tree as a living sacred entity, or as the equivalent of a temple, people will protect it. It is no longer seen as a commodity, or as vermin.

How we perceive and contemplate the land affects how we treat the land, and ultimately how we live on it. We are less likely to honour and respect the land if we see it as separate from ourselves. This perception remains pertinent irrespective of how the land is ideologically managed across cultural divides.

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8. DESIGNING THE CULTURE OF THE COMMON AND THE PSYCHOLOGY OF UNSETTLEMENT

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Abstract

The still growing biophysical instability of the planet is well known. What is yet to be grasped is the interrelation of other major factors to planetary and socio-cultural destabilization. This paper aims to demonstrate that late modern human psychology is one of these factors and, as such, a contribution to unbalance. It will specifically investigate the potentialities of "a culture of unsettlement", which requires detecting the hindrances connected to the formation of the condition. Pursuing this further, it will look at: the refusal to acknowledge the magnitude and coming impacts of climate change and the imperative of creating a "community of the homeless". Special attention will be given to the definition of negation in contemporary society. Examples will be presented here showing the reluctance of developed westernized societies to recognize the already revealed and increasing presence of unsettlement, as it expands what homelessness is and does. The paper will also expose the human unpreparedness to deal with emergent environmental conditions and the global spatial order. In this context, it questions how to recompose a community based on "the Common" to counter societal fragmentation - this established in a new ethos grounded in modest ways of life.

Keywords: Climate change, homelessness, unsettlement, community, design psychology

Introduction

Every day people get up. Drive to work. Turn on the air conditioning and eat whatever is available in the supermarket. For hundreds of millions of people around the world every day is the same: comfortable, uncomplicated, mechanized. The contemporary reality of individuals living in westernized countries is identical. The pattern of their behaviours towards society, labour, politics, partners and friends is endlessly mirrored. The illusion of satisfaction is tangled in the post-industrial conditions of neoliberal society; in a misapprehension of security, consistent with the effortless reality of a blindfolded life where upcoming climate disasters, food and water depravation, wars and mass destruction weapons and immigration waves exist only in a sealed Pandora's box, located somewhere in a distant televisual universe. In this world of the everyday, all appearances of balance belie the reality of unbalance caused by all forms of unsustainability.

Avoiding the confrontation with actuality, allows people to disregard that security is counteracted by destruction: nature by its violation, energy by the exhaustion of its resources, technology by its governance over people (Marcuse, 1995). Undeniably, the reluctance of confronting the arrival of the unavoidable, the irreversible side effects of three centuries of industrial modernity, is a psychological as well as a social/political condition; its psychological aspects will be explored through the notions of negation and unsettlement and its political and social properties will be interpreted by investigating the alternatives against capitalistic universalism.

This paper is a contribution to the attempt of going beyond the biophysical understanding of unbalance and of exposing the vicious circle of the creation, acceptance and global dominance of superimposed needs (Marcuse, 1995). Its aim is to detect the psychological and socio-political

qualities that need to be altered in order to design a non universal, non homogenized but interconnected community able to survive and cope with the present and the soon to be here biophysical and social changes.

The negation of change

> "Affirmation - as a substitute formation - belongs to Eros; negation - the successor to expulsion - belongs to the instinct of destruction" (Freud, 1925).

Undeniably, the uncritical and effortless existence in a virtual normality is not a by-product of lack of intelligence or intellectual blindness. People in all westernized communities want the same thing and through their actions they express the same conviction that the world will stand still and nothing bad is going to happen. There are many theories supporting man's tendency to negate and accept negation as reality.

Based on Kant's theory (1781/1990), negation is a matter of perception, with reason being what appears in front of the bystander. And how "man" perceives a certain situation plays a negative role by determining the limits of the phenomenon of what a self experiences through the senses. Making predictions about a future from the viewpoint of what we currently acknowledge as "normal living" curtails the reach of our rationale to grasp scenarios related to uncontrollable climate disasters and irreversible alterations in means of habitation of multiple forms of life. Another way to understand negation is by exploring Hegel's (1831/1969) concept of universal determination, wherein every category has a contradiction, a negation of a being via nothing, and a retrospective sense of that contradiction in order to create continuation (that would again be negated). This could be acknowledged and explored in today's existence as understanding an anomaly as normality (the de-futuring methods of structuring lives, societies, cities, countries etc.), not understanding the anomaly as normality (why is that wrong in the long term?) but in the end, being accustomed to the anomaly as a normality (the world as we know it will remain the same, even by following de-futuring methods in order to sustain it).

Against this backdrop, psychoanalysis exposes the negation in people's tendency to repress the undeniable facts and continue consuming, designing products, constructing buildings and hyper-cities and making babies. The necessity of being consistent with the illusion of moving forward is facilitated by the manipulation of "man's" psychic forces through defence mechanisms (Green, 2005) that allow them to create cognitive schemata consistent with the condition they live in. By negating a chaotic world, "man" is avoiding the confusing conditions that disturb his/her psyche. Lacan (1953) posited the opinion that negation is a defence mechanism that allows humans to cope with post- industrial societies' disturbing disorder. By refuting circumstantial truth, one reveals an essential ego function, a mechanistic denial of recognizing reality (Lacan, 1953).

Defence mechanisms were first introduced into psychoanalysis by Freud as a means of coping with pain and discomfort by subconsciously metamorphosing realities. "Negation" is strongly connected to Freud's notion of *Unheimlich* (uncanny) where "un" signifies repression (Freud, 1919) and is identified by him as the seal of death (*thanatos*) (Freud, 1925). The act of negation comes out of the decision (usually subconsciously) to deny the acknowledgment of certain circumstances, resulting in their repression. Sartre supplemented this idea (1958c/1989) by claiming that this negation of the true condition of existence doesn't come from a negative judgment as defence against the way of the world really, but from a nihilistic self, a consciousness that is empty and allows the person to see nothing outside of it.

An additional interpretation of the contemporary avoidance of facing the unpleasant connected to

psychoanalysis is rooted in negative narcissism, a term used by Judith Butler (1993) based on Freud's (1914) explanation of narcissism[3]. The failure of fulfilling the purpose of narcissism by complementing "the egoism of the instinct for self-preservation" (Freud, 1914) leads to a condition whereby the psyche seeks for self-eradication that subsequently results in a nihilistic tendency of non-participating, uncaring, disengaging and experiencing vacantness. This condition of fear and uncertainty is translated into a world of stability (usually through the distorted lens of the media), promoted by a self-limitation that people refuse to acknowledge. By adopting this "taboo", a fabricated notion of existence replaces what truly exists.

Therefore, a problem is again generated; how to reconcile these two sides, the real and the unreal. Through "negative dialectics" Adorno (1966/1973) tried to detect where the problem is by recognizing the lack of reconciliation between individuals and their freedom, (the) self they left behind for quantity, materiality, conformity. He pointed out the need for human beings and human practices to be detached from the absurdity of the capitalistic driven cultures, for people to re-attach themselves to their true and only home, nature and earth. It's funny how people are terrified at the idea of being homeless and simultaneously refuse to fundamentally recognize where home is – this estranged home, the home they've already lost.

The conditions of homelessness and unsettlement

Developed societies' negation towards present homelessness and unsettlement has been demonstrated through many examples. At the beginning of November 2012 New Yorkers were devastated. Because of Hurricane Sandy[4] hitting the annual marathon was cancelled causing long debates and extended coverage in the press. Marathon runners kept complaining about the hardship of their training and preparation and how the aftermath of a hurricane was affecting their life so greatly (*The New York Times*, 2012). They saw it this way because except from a few days without electricity and hot water, and repairable material damage, there weren't any major changes in the urban scenery that could remind its citizens a month later that they'd experienced the limited and local effects of climate change – this because the material fabric of New York is not Haiti, or Burma, or Bangladesh. It's not New Orleans either. New Yorkers have distanced themselves from the condition of unsettlement happening in New Orleans for quite some time now. Seven years after hurricane Katrina destroyed the built environment and the social habitat of New Orleans, the population of homeless people has doubled, people are still misplaced and families are scattered (Cockerham, 2012).

While the international mass media were covering the anticipation of hurricane Sandy and its pre-estimated impact on American states, only few references were made to the Caribbean area and its endangerment by the same weather phenomenon. The day after the hurricane found the majority of the citizens of the New York metropolis safe and sound, whereas in Haiti, Jamaica and Cuba people were facing destroyed crops, damaged homes and ripped-down power lines (*BBC news Latin America & Carribean*, 2012). This was especially so in Haiti, still unrecovered from the 2010 shattering earthquake and the more recent tropical storm Isaac (August, 2012). It was again left with a homeless population, facing the second phase of its unsettlement. From the 370 000 Haitians living in refugee camps since 2010, 200 000 lost their temporary housing because of hurricane Sandy and were forced to live outdoors due to state's inability to place

[3] An original libidinal cathexis of the ego, from which some is later given off to objects, but which fundamentally persists and is related to the object cathexes, much as the body of an amoeba is related to the pseudopodia which it puts out (Freud, 1914: 75).

[4] Sandy was the largest Atlantic hurricane on record, developed from an Arctic jet stream wrapping itself around a tropical storm, that shattered portions of the Caribbean, Mid Atlantic and East coastal states of America in late October 2012 (*Reuters US edition*, 2012).

more than 17 000 in emergency shelters (United Nations, 2012). Haitians had and have nowhere to go to. The people are facing food depravation and diseases, such as cholera and diarrhoea because of the lack of pure running water. For them being homeless is not a transitory condition anymore, but a permanent one, following the lead of people in Burma[5] and Bangladesh[6]. The continuing existential status of these people is "unsettled". They experience unsettlement as they cope with hunger, conflict and the lack of shelter. But it is also psychological. They have to face living with the acceptance that it is not something that will change anytime soon or that will just go away. It is an emotional and mental shift from privacy, attachment, materiality, conformity, individuality to displacement, detachment and collectivity. Their negation towards accepting the real became acceptance after undergoing the disappointment of not returning to their "ordinariness". In common with all the habitants of the contemporary world:

> The establishment of settlements and the making of houses constituted "the world" as an exteriority. These events marked the loss of the world, an abandonment of "being at home in the world" as one's absolute "homeland" (Fry, 2011b).

Unfortunately, populations of climate migrants didn't have the opportunity of living longer in the condition of negation because climate disasters misplaced them in the most abrupt way. On the contrary people in developed societies, which were able to cope with their share of disasters (for example, New York and Hurricane Sandy, Japan and the Great Eastern Japan Earthquake and tsunami that likely caused the nuclear crisis at the Fukushima Daiichi plant) continue negating that being homeless is a current and not an imaginary condition by negating the world of their dependence. Many will continue to live the illusion that they do have a home and that they are settled - until the moment arrives when they aren't.

Towards a culture of change and commonality

As previously indicated, the misconception created by the case of New York in relation to Haiti (and the other truly wounded areas from the hurricane) is a repetition of a reality that keeps demonstrating the limitation of contemporary westernized thought. This indicates the dominance of a globalized culture (wherein ethics and integrity have been exchanged for a quantity of life masquerading as quality and satisfaction) – this all in a division of the world into spheres of the developed (the "self", the New Yorkers, the negating kind that will get away with it all) and the underdeveloped (the "other", the Haitians, the misfortunate that have to deal with the it all). The true irony stands where the margins between the settled and the unsettled are placed within the same country, where the "other", is the same but different in terms of rights and privileges (the case of New Orleans).

With such thinking conditions it is impossible to disconnect material from culture resulting in a standardized culture that negates reality in order to proclaim as change the technological progress and the continuation of consumption. What needs to be stated here is that the foundations on which the current globalized society and culture are built are unable to support the day after tomorrow. Under these current circumstances there is very little chance of survival. Negation, individualism and the globalized homogenized notion of culture under the

[5] In 2008 Burma was hit by a devastating cyclone that caused the death of at least 138,000 people and left millions of people without shelter, food and drinking water. A year later, half a million of people were still in the transitional after disaster stage living in poorly made temporary facilities, totally inappropriate to protect them from monsoons (Pidd, 2009).

[6] Bangladesh was devastated by cyclones, floods and ruined crops twice in few years, by Cyclone Sidr in 2007 and by Cyclone Aila in 2009. Number of villages became uninhabitable due to floods, flattened homes, ripped off trees and destroyed networks of power and water (Vidal, 2012).

umbrella of neo-liberalism don't leave room for adopting alternative practices, policies, lifestyles, or the development of a new concept of interconnectedness. This is because, in current terms, interconnectedness is translated into technological connectivity, the virtual representation of self through the machine. And that's exactly the opposite to what could make a difference: the dependence on human interconnectedness and on a community of people sharing the same values, striving for solutions and options in order to sustain life.

In actuality, undoing the contemporary status and designing a community of interconnectedness would involve a first step in suspending modes of segregation. The community of interconnectedness should include the "other", recognize the "In Common" (Nancy & Strong, 1992) with what has been excluded because of the imposed superiority of colonization, and redefine the "Common" as the core idea that formed communities during the entire historical span of human presence. "In Common" is not a synonym for defunct communist regimes and their attachment to romanticized materiality, obsession with progress or scientific dogmatism. It only shares a mutual goal with communism: the *search for the Common* (Latour, 2010). In the "compositionist manifesto" Latour (2010) underlines the importance of building the new Common world by gradually composing the correct existing pieces that can lead humans to a future. His compositionist theory clearly poses the problematic of interrelating the "masses", creating a universality that doesn't exist yet, but is absolutely necessary, while equally designing a community based on dissimilarity, versatility, instability, multiplicity that will never become homogenized. The embrace of a heterogeneous society is also connected to Mignolo's (2007) suggestion to de-link, retreat from the notion of universality, especially when it is originated in a specific ethnicity (Eurocentrism) and move towards a pluri- versality whereas knowledge and understanding derive from the local, the ethnical and the disengagement from the colonized sameness. Putting together a coexistence of many worlds would be a task grounded in profound mental and perceptive change and in a process of learning how to unlearn and re-learn[7].

Of course, the disconnection with the monotropic thinking of colonialism is a demanding task. It requires unlearning of principles that defined man's being for centuries and decades. In general terms one can say that the understanding of the world through the Greek logic, the linguistic origins of Latin and Greek, the humanistic approach of Enlightenment, not least framed by Kant (1781/1990), and the perception of economy based on the teaching of Hobbes and Smith (Mignolo, 2007) sum up, more or less, what it is perceived to be as real. As it is recognised through the globalized understanding of the world, truth is Eurocentric and linear and detached from the veracity coming from other cosmologies (indigenous models of interpreting the world, indigenous/tribe languages, different understanding of the nature and different behaviour towards the biosphere). The reluctance of confronting the lack of many truths is greatly related to people's dependence on the myth of happiness promoted by modernization and supported by the "big Other"[8], the regulative principle. This problematic relationship between man and the "big Other" has led in the recent years to the "culture of complaint" (Zizek, 1997) where humans project to the State their incapability of reacting towards the current conditions of living. The big Other is to blame for everything that's degrading or everything that has been compromised (values, morals, physical environment). In this context, creating the conditions of the radical transformation of society into a responsible collective capable of sustaining life and respecting its biophysical dimension, entails a simultaneous alteration of state mechanisms and the "character structure" (Marcuse, 1995) of humans involved. Re-inventing their existence by defining their

[7] Translated by the original phrase "Aprender a desaprender y reaprender" that was used by Luis Macas and Jorge Garcıa in the working document of the studying program of Universidad Intercultural de los Pueblos Indígenas del Ecuador (Macas, Garcia et al. 2002).
[8] A Lacanian term used to designate the "symbolic order".

own fate means acknowledging the non existence of the "big Other" and raising questions concerning the notion of belief, of symbolic trust, of credence, of taking what other's say "at their word's value" (Zizek, 1997). This kind of shift is bound to rejecting notions attached to any form of political power. It also strongly connected to the nonappearance and deficiency of national boundaries and political regimes in the presence of massive catastrophes caused by climate change (Zikek, 1993).

A new community ready to overcome the environmental challenges and the condition of being without a home should be established in terms of equity, liberated by the illogicality of social and economic division (Badiou, 2008). In other words, the Common must no longer be a synonym of traditional relations defined by political or class supremacy and sponsored by capital and its paraphernalia, and it shouldn't be dictated by factors that define "development", "growth" and "wealth". On the contrary, it should be grounded on the replacement of material attachment and quantification of everyday life by a qualitative approach of surviving through human interdependency. Most importantly, the Common must derive from man's reconnection to *Ecumene*, the world of human habitation, home. Watsuji Tetsuro in *Climate and Culture: A Philosophical Study* (1961) gives his own interpretation on how people and land concur in a sociological and historical actuality:

> [...] But this is not simply the nature of those who inhabit the desert, for they do not live isolated from the desert nor does the desert exist as a natural phenomenon independent of man. Desert man is fundamentally of the desert; the desert is a socio-historical phenomenon. And the nature or the character of a people is, after all, its historically and climatically distinctive way of life.

So, to be part of this world means to be able as a "man" and as a community to interrelate with the world in an interdependent model where all the cultural elements that nourish the human understanding of the world come as a consequence of this process. In current conditions, the climate reminds humans in intermittent, violent and unforeseen ways that they lack independence and the need for redefining the essence of their existence through their re-evaluation of human interconnectedness. The political, the capital, the racial don't really define human interconnection, and certainly will not lead to perspectives and alternatives beyond the created extant defuturing condition. The mental and psychological shift from security under the wing of human dominance can no longer be awaited. As it is becoming increasingly evident, the only survival means people have at this chronological and historical time is to recognize that the existing model of the cities will collapse under the pressure of overpopulation and that unsettlement is a present condition for all populations. In addition, it is crucial for humans to accept the inevitability of being adaptable towards uncontrolled climate phenomena and the great need for creating a community ready to adjust to alternative ways of earthly habitation.

Designing the mode of shared living determined by environmental challenges is a requisite of the present and the future as is the abandonment of the conception of the world as Anthropocene, generated by the arrogant notion of human control over the earth. This ontological turn towards overwriting culture and state, living with less and being on the move is similar to the Urmadic city (ur*ban* no*madic*) paradigm (Fry, 2011a) where a qualitative socially driven economy replaces the quantitative one, minimizing at the same time the routine ecological damage and re-establishing human connection to work, property, material.

Undeniably, what Western modernity left behind was an illusion and the forthcoming demanded more than consideration (Latour, 2010). That is a silly mistake to repeat! Instead, the time is now right for lessons from the present phenomena (climate disasters, climate migrants, exhaustion of resources) to be taken under serious consideration and be placed in the centre of human action, replacing the uncontrolled human abuse that led to the biosphere derangement.

Conclusion

Anthropos in ancient Greek stands for "the one who looks above, upwards". Not downwards, and not backwards. The task of transforming the world into Anthropocene wasn't constructed as an uplifting vision. On the contrary, it was the artefact of human arrogance and grandiosity that led to the repetition of the Icarus wings' effect- brought the human ego to close to the sun having as a result its vertical fall. And still, the fall is not clearly understood.

This paper's goal was to demonstrate the psychosocial aspects that support the lack of the clear recognition of the state the world is in by the many aspects of negation and to show the humanity of two speeds: one that experiences the unsettlement pragmatically and psychologically, and another that rejects the unsettlement in which it is already placed. The reality is that there aren't any mathematical equations or undeniable scientific methods that can reverse the situation. The suggestion of a commonality under the shared threat of not having a future is not the sole solution but a starting point of revising the understanding of human existence. The recommendations regarding the creation of the community of unsettlement, originated in what went wrong during the era of Western modernity, are not panacea and there are a lot of things that need to be resolved in the process of reconstructing the mentality of "living together". Initiating the discussion about what should be included, abandoned, retrofitted, excluded is an invitation to everyone to reconsider how to alter depending realities on things, technology, procedures and services and start examining the prospects of a future built on true necessity and not desire, on pragmatism and not escapism. Ultimately, the only way of approaching change is to start thinking of how to redesign the world by ontologically redesigning the human kind.

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9. GARDEN IN THE MACHINE

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Abstract

This paper addresses historical and contemporaneous perceptions of pristine wilderness and Arcadian landscape as well as current analysis of what we recognize as our socio-ecological context, by highlighting the contemporary garden as a generative construct. While building architecture continues to rely on the Modernist construct of the nature/culture dichotomy, the architecture of the garden makes it into an interface where the boundaries between *nature* and the man-made are negotiated. As an architect, I propose an exploration of this interface's relation to a context where the perceived intersection of human time with geological time is affecting both ecology and society at a structural level, as a generative tool. The design of a temporary garden, *Buoyant*, is presented as a case study that proposes an alternative ecological imagination for design as a counterpoint to the nature/culture dichotomy underpinning not only architecture practice, but the construction of most contemporary eco-narratives. Ultimately it imagines a collaborative "building process" that appropriates some tenets of landscape urbanism for architecture.

Keywords: Garden, ecology, architecture, romanticism, econarrative

Introduction

The current interest in ecosystems thinking, popularized by the imperative for sustainability in architecture, proposes a paradigm shift that blurs the dichotomy between nature and culture. In line with this, landscape and architecture can no longer comfortably function within the clarity of this distinction. Accepting the definition of our current geological period as the anthropocene, which describes a place and time where humanity's mark has extended even to the geology of the planet, we must presuppose that there is no more, exclusively, a human history or a non-human nature.

Timothy Morton, in *Ecology without Nature*, argues that the18th century Romantic image of nature perpetuates the nature/culture dichotomy that persists through modernism, and continues to prevent us from leaving behind an anthropocentric world view (2007). This dichotomy emerged in Enlightenment philosophy with man as "master and possessor of nature" (Descartes, 1637, p.107) and continued through Romanticism's fetishizing of nature as unspoiled and wild. Intending to evoke awe, sublime Romantic Period landscape paintings, like those of Thomas Cole, portray wild landscapes as untamable, even dangerous, and certainly beyond human control. These constructs can only be admired from afar, for the power of the wild would be diminished by man's transgression.

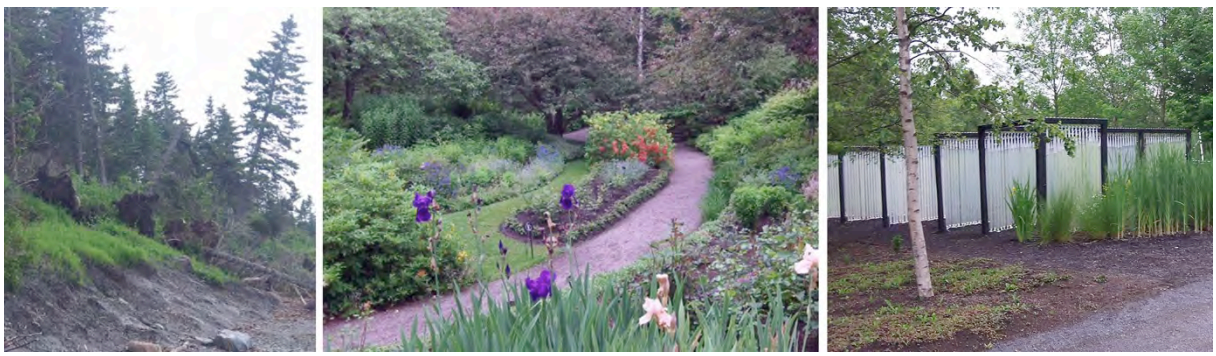

Figure1. a) Métis River Park b) Reford Gardens c) Garden on Festival Site

Current "greening" efforts respond to a perception of nature as a commodity that can no longer be tapped. Compounding this with a Positivist understanding of sustainability which moves design into the quantifiable to address this anxiety, we assert a judgmental narrative of loss. This eco-narrative is informed by the 18th century Romantic image of an unattainable nature. These images have defined how we interface with our context: we cordon off that which we hope to maintain as natural (Figure 1). However, ecologies are not easily contained, so longing for untouched nature transforms into a narrative of loss of the "wild". Centuries later, the image of pristine nature pervades not only our popular culture but in the efforts of conservationists and ecologists who cannot help making the reestablishment of pre-human conditions, not simply a baseline for assessment in their research, but a goal. Setting the wild pre-human nature as a goal defines it as "good", and all else is at best seen as damaged, and more judgmentally, as bad. Unintentionally forming an exclusionary framework, this image keeps us from engaging the non-human agents that make up the multiple intertwined ecologies we inhabit. Because of this split, we cannot perceive ourselves as part of a larger system involving multiple agents.

Morton proposes a way out of this nature/culture dichotomy, by re-imagining ecology without submitting us to the "ruthless ransacking of nature" (2007, p.140). In such a reconstruction, there is no background, nor foreground, nor unattainable horizon, just sets of intertwined, active *hyper-objects* with which we coexist (Morton, 2012). This approach understands both the human-made and natural world as constructed images, and as images they have little bearing on the intertwined events of existence. Like ecology, this eco-centric construct includes multiple entities (waste, fauna and flora, human bodies) and their real and possible worlds, intertwined as a community. The garden is an interesting lens for designers of space and place through which to look at Morton's alternative approach.

The Machine

The opening of landscape architect Ian McHarg's influential book *Design with Nature,* draws an image of nature's splendors being spoiled by architecture's encroachment (1969). Only nature in its wild historical form is seen as valuable, despite the fact that ecologies thrive despite "human intervention". These may simply not be the ecologies we prize. Pitying nature against built space, eco-narratives have adhered to this formula by communicating an anxiety of loss to which architecture has been a prime contributor (Fletcher, 2009). No doubt architecture is not innocent of this accusation, but grappling with this anxiety rather than acquiescing to its verdict provides a more useful design space. We can index the relationship between architecture and nature looking at three houses by well known architects: Le Corbusier, Future Systems, and Vassal and Lacaton.

The break of our connection with our natural environment is clearly depicted in icons of modern architecture like Le Corbusier's "machine for living" the Villa Savoye. The building sits in a clearing off a wooded landscape. At an appropriate distance the trees form an accommodating ring around the cubic volume. Levitating on its pilotis, above the ground, it provides a flow for cars underneath it. Visitors move from their transports to the house's second floor and roof garden. There they can observe through the horizontal windows, the tree canopy; abstracted and flattened into green wallpaper set in recessed frames. The encircling trees are beautifully behaved, as if they had stepped aside to allow the machine its rightful place in the center of our universe. As a model for engagement with its context, the villa is thoroughly detached, allowing the ground plane to flow through almost uninterrupted and displaying "nature" in a well-defined frame from the window or the terrace.

A contemporaneous model for architecture aims to be integrated with its environment. The literally "green" building is exemplified by Future Systems' weekend house in Whales. It is subsumed in a nature reserve and acquiesces as much to the needs of the protected ecosystem as to the desire to maintain the image of the wild. The earth mound placed around the house responds clearly to a mandate to reduce or even hide the mark of human intervention. While the exterior of the house becomes part of the groundscape, due to the local weather the interior space is contained by impervious sealants and fixed glazing. We have made great advances in training nature to live on the

boundary of our architecture, and designing that boundary to become "naturalized", as shown by the proliferation of green walls on institutional buildings, but it is difficult to let that messy "nature" structure our buildings.

A space structured by "nature"; the tree house is perhaps an example of an approach where flora and the construction engage each other literally. An example that uses a modernist aesthetic, while integrating nature into its interior space is Lacaton and Vassal's House in Lege. It presents a building where the flora (and maybe fauna) begins to occupy the same space as the built form making a community of parts. Three trunks skewer the interior space. Neither architecture nor nature is overly considerate of the other, but both make concessions where needed. There is a lack of romanticism in this example where nature is not an image but a fact. This real, tangible nature may shed and make the inside messy, or die and leave a void and yet its violent puncturing into our space is not only acceptable, but also desirable.

The collapse of the nature/culture divide is relevant for today's architect because it provides an alternative approach to the reoccurring object/field preoccupation. Arguably, buildings have worked against their field, excluding the environment they are situated in. This is perpetuated by building technology, which hides our connection to nature, our impact upon it, and most poignantly our interdependence. The modernist object is turned "green" by integrating landscape components that perform its services in the surrounding field. Seeing the object and the field are inseparable, our medium has become increasingly "responsive" and engaged with the context while it retains the same technocratic mandate of creating a homeostatic condition within a protective boundary. When landscape is brought onto the architectural surface, it affects the frame rather than remaining an image. Going beyond the frame proves more difficult, as we seek to integrate nature and architecture to form a nonhierarchical relationship. Perhaps, we can fulfill this desire by bringing the garden, rather than all of nature, into the machine.

The Garden

The decade old project of Landscape Urbanism, embodies the lack of distinction between nature and the man made and offers an interesting model to the more established practice of architecture. This track in Landscape Design proposes the coupling of man-made and natural systems rather than the subjugation of one to the other. As an understanding of ecological models not limited to pristine natural condition, it blurs this divide through a productive amalgamation of systems thinking, organizational and performative paradigms. Although provocative, inspiring, and informative, to architecture the majority of this work focuses on much larger temporal and spatial scales than are directly applicable.

The immediate scale of the garden may offer a more accessible model for addressing the blurring of the divide. It is a designed space where historically man has endeavoured to practice and represent not only his control over nature (perhaps more clearly demonstrated in the agrarian landscape), but also his engagement and appreciation of it. As a realm for aesthetic pleasure, it can be removed from performative expectations, so it can explore other relationships. Robert Pogue Harrison, through his analysis of gardens in Western literature, argues that "gardens do not bring order to nature; rather, they give order to our relation to nature" (2008, p. 48). The garden reveals our ideology about our ecosystems - environmental or socio-political.

This is evident in garden design of Western traditions leading to Modernity. Pogue Harrison observes that in the 16th century, the Italian Renaissance presents a style of garden architecture in which art neither dominates nature, as do the 17th century Gardens at Versailles, nor flatters it, as do 18th century English Landscape gardens. Unlike Renaissance architecture, garden design does not follow the humanist tradition exalting man above all else yet. Instead, it collaborates with *nature* to create a humanized space that is at once formal and wild putting nature's species and landscapes on informal display. Pogue Harrison quotes Edith Wharton's description of the Italian renaissance architect who discovers through his window that the "enclosing landscape" was "naturally included" within his

garden, proliferating the points of focus by blurring the bounding line (2008, p. 85-87). This sensibility diverges from that of the medieval cloister garden or late renaissance princely garden, designed to be perceived as an image, rather than experienced.

This integrated model of garden design dissolves with the emergence of Descartian philosophy that subjugates all to the will of man. Representation of this line of thought moves garden design again towards the imagistic. In André Le Nôtre's 17th century Gardens at Versailles, designed for Louis XIV, the ideology of the period is clearly articulated: man is above all other beings, and the Sun King is above man. This manifests in the controlling geometry imposed over flora and hydraulics. The desired experience is not of the beauty of nature, but rather of the power of man who has subjugated the forest into perfect repetitions of geometrically arranged points, lines and planes. Subjecting flora and waterworks to the perspectival gaze of the Sun King, the image is all-important in this garden. The artifice of the garden parallels the constructed social hierarchy aimed to please the Sun King. There is nothing natural in the behavior of garden occupants – geometric plant and courtiers are just part of the scenography.

The drive for control of nature (and human behaviour) is countered by a call for expression of nature by the Romantics. It is manifested in the objectified wilderness of the English Landscape garden. Interestingly, these gardens attempt to build a more perfect "nature". A prime example, the Gardens at Stowe, in England construct an idealized image that represents "nature" but is in the true sense of the word, a *landscape*. The term landscape has always defined a man-made construction. Originating in Germany to describe a painted scene of nature, the term only becomes associated with real physical environments in the eighteenth century. Joining land and scape, which means to shape, landscape is not etymologically linked to the wild undisturbed pre-human nature, but to an image shaped by the human hand. A designed construct, landscape was never "natural". However, the Arcadian fantasy of Romantic paintings and gardens renders nature as a distant pristine *other* rather than as a human construct. This *otherness* is palpable in the sublime paintings of the period like C. P. Friedrich's *Wanderer above the Sea of Fog*, where nature is violent, and cannot be directly engaged, only observed at a distance. However, it is also apparent in pastoral depictions of emotive arrangement of trees of period gardens and paintings.

Nature is reified in these two seminal gardens, first by an attempt to control it, later (and in response) in an attempt to put it on a pedestal. This reified image is ingrained in the longing for the pastoral idyll that defines the identity of the American imaginary in relation to Nature (Marx , 2000). This perception drives conservationists to fence off the bits of remaining wilderness to keep wayward genetically altered, or simply invasive-flora and fauna out of these sequestered sites. Although this is a wholly human endeavor, due to the Romantic construction of Nature as the other, the expression of the human hand in such efforts is intentionally obfuscated.

The erasure of the human hand is a trademark of the popular naturalistic garden aesthetic prevalent since the advent of the English Landscape Garden. A Canadian garden in the English landscape tradition embodies these ideologies. The construction of an idyllic ecosystem to support a variety of exotic and native plants (up to 3000 species), and the picturesque Arcadian image of the landscape come together in the Reford Gardens at Metis, Canada (Figure 1). Painstakingly carved out of the wilds of the northern forests, it is a striking New World example of the Romantic English Landscape Garden not to mention human ingenuity. This Eden on the shore of the St. Lawrence Seaway was constructed, over three decades, by Elsie Reford. The meandering ravine enveloped by elaborate planting arrangements, flowered meadows, and shady paths present Naturalist garden aesthetic in grounds that were manufactured from the flora down to the soil composition. A collage of species of the "right" form and color, it epitomizes what we have come to admire as a "natural" setting. It is set apart from its context and articulated formally through artistic arrangement plants rather than through any visible structure.

In 2000, a portion of the Reford property became devoted to an annual International Garden Festival touted as a forum for experimentation and innovation. Its founders conceived of it as a venue to reevaluate the Naturalist aesthetic that dominates the practice (Hybrids, 2006). The garden has

historically played a significant role in negotiating the boundary between artifice and nature. But, what role is the contemporary garden to play when we recognize that nature and artifice are one and the same? How does the eco-utopia that is the garden help us formulate a new direction in the architectural imagination?

Buoyant: Bringing the garden into the machine

Buoyant is a temporary garden, commissioned as part of the *2012 Jardin De Métis International Garden Festival* (Figure 2). The project reflects on the role of the fabricated landscape and contemporary rhetoric on ecological aesthetics by problematizing our understanding of autonomy and control. It does this by confounding the roles played by armature and plants, caretakers and occupants. Rather than controlling and ordering the growth it evolves as a collective that includes multiple players and their "real and possible worlds" (Morton, 2007, p 140).

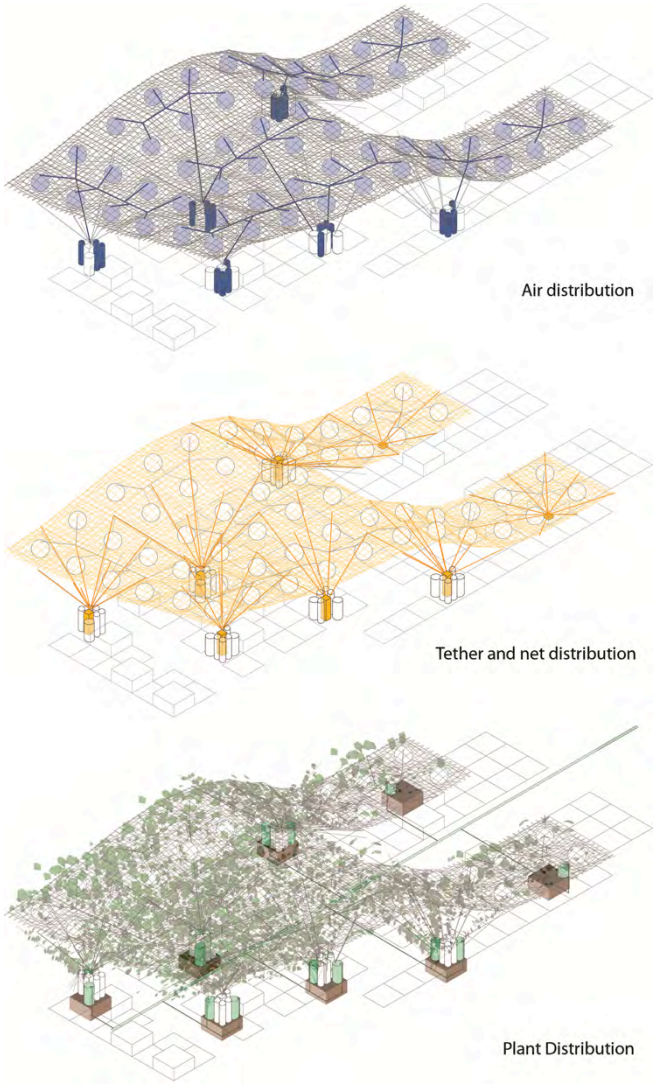

Figure 2. Community of parts: net, tethering, planting, and nutrient distribution

Tethered down to the ground at the maintenance bundles, it imagined architecture so light that had to be tied down rather than held up. Helium filled balloons were to be used to suspend the vines. If the structure remained in place the vines would begin to thicken forming trunks to hold up their formwork. Form and formwork were intended to become a composite over time. From the time of design to the time of construction there developed a shortage of helium making the primary

"construction material" prohibitive in terms of cost. Helium was replaced with compressed air, but air filled balloons could not hold themselves and the net up. The challenge became keeping the balloons as a free-floating structure.

Figure 3. Buoyant installation at the Jardins de Métis

Buoyant plays with the perceived functions of common architectural garden devices- the wall, the trellis, and the reflecting pool- by allowing existing and planted vegetation to assert equal agency in the structuring of the garden. The garden is organized by three components: a suspended trellis; a reflective, tiled ground; and a wall of trees. The trellis, composed from a net containing sixty transparent inflatable bubbles sewn at 3'x3'intervals, hovers over the site as if floating on the wind. Planted vines in key locations under the trellis make their way up to it, perceptively grounding the wayward architecture, which could escape with a gust (Figure 3). Throughout the season, the vines reshape the trellis again and again by bunching, and pulling and adding weight to it. As the growing season progresses, the net disappears from view and at the peak of the summer heat, the translucent bubbles create openings in the vine canopy to diffuse light into the cool grotto space beneath (Figure 4).

Figure 4. Full vine growth creating cooling grotto like space

The mutable trellis's construction contrasts with that of the ground level but its behavior is similar. Composed of mirrored cubes in a gridded shallow pool, it is ordered, and rigid, but its surfaces reflect the movement and play of its surroundings. In the sun it can be blinding, in the rain it multiplies the

bubbles. In the shade the reflective surfaces make the space ambiguous collapsing images of the surrounding flora onto the tiles and displacing the surrounding forest into the garden (Figure 5).

Figure 5. Reflective cubes displace surrounding flora into the garden

It uses reflected transposed images to create verdure where there is none, making a pictorial garden from a gridded hardscape. The flora reflected on these hard surfaces dissolves the blocks to heighten and collapse the distance between the controlled and untamed landscapes. The dissolution of surfaces through reflection is abundant in architecture. A seminal example is I. M. Pei homage to Richardson's Church in his reflective high rise. It blends into the fabric by surfacing itself with its neighbors creating a fiction like constructed naturalist landscapes do. Performative landscapes often take on this mimetic language, attempting to replace that which was lost – the wild. This pursuit of the image rather than just the ecological function maintains the nature culture dichotomy as does the exclusionary reflective glass wall. Displacing images of the flora onto its surfaces, Buoyant exposes the landscape as a representation. Through this layer, the installation exhibits and contrasts the geometric order of Versailles and the "natural" order like Stowe.

The trellis itself plays a very different role. It is directly engaged with the flora. It uses it to for support. It is tethered to the surrounding trees. The tethers that connect it to the ground provide the structure for the growth of the vines. It forms an interdependent system,which defines its form and is the infrastructure for its growth. Before the vines have begun to grow over it, the trellis visually flattens the surrounding pine canopy into its distorted grid, while the reflective pools and transparent bubbles absorb sky and canopies (Figure 6). The expression of human order and its potential to create a responsive system is the main design goal.

Figure 6. Buoyant bubble grid (photo by R. Baronet)

Buoyant's image has something of the carnivalesque about it. Part house of mirrors, part balloon man, it was aptly described by a visitor as ludic (Figure 8). As such it engages both young and old in play on its own terms, and may even reveal itself, as it did to one little boy, as an architecture/nature construct much like a Portuguese Man O' War, which he said although it resembles a jellyfish (which others saw in the tentacled bubbles), is actually a community made of specialized organisms integrated to one another… and I added… and that are not capable of independent survival. A growing collective, the architecture and the flora together not only change the ambient and visual perception of the garden room, but they literally reform trellis over the growing season hence the role of "caretaker" is transposed to them.

Like gardens designed after geometric models of Eden, *Buoyant* was designed as an abstraction, but unlike them its architecture mutates over time in response to vegetal growth. In the western tradition, Eden was the primordial ecology. However, as Joseph Rykwert observes in *On Adam's House in Paradise,* Eden is not a place of pure nature but a garden (1972, p. 13). It is an abundant landscape where all is "pleasant to the sight and good for food" (Genesis. 2: 8-9, *King James Version*), but it needs to be crafted and maintained (McClung, 1983). Earth, sun, and rain provide what plants need to grow, but even in Eden, Adam must tend to the garden which he is instructed to "dress and keep" (Rykwert , 1972, p. 13). As opposed to the Romantic wilderness, Eden demands engagement.

Eden is not the only landscape that explicitly requires human input for its existence. Pogue Harrison highlights other gardens in western literature that demonstrate a caretaker approach between man, nature, and culture. In Greek and Roman tales of heroes and philosophers, protagonists choose the responsibility of constructing and caring for their environments, even escaping from Arcadias of repose for Utopian prospects of creation line (2008). They are driven to engage in what Morton would call "an already historical nature". Stewardship, references a reciprocity and equitability between human and non-human agents leading these actors to choose an Epicurean ethic of cultivation over a Hagelian ethic of commodification of nature line (Pogue Harrison, 2008).

Buoyant was conceived to highlight this aspect of our relation to nature, our role in its maintenance. It exhibits a need for human intervention not just in its initial transformation of the "wild" into a "cultured landscape". Its two mismatched grids are bound to each other at "maintenance bundles" where both the gardener and caretakers interact with the structure. Since both the plants and the trellis are fluid and collapsible, the requirement for maintenance of the infrastructure for growth and the growth itself is made apparent in the composition of the maintenance bundles. Here air tanks sit alongside planters of *Cobaea scandens* vines, and tether lines provide paths for air hoses and vines to move between the grids (Figure 2). The plants require regular care and watering, while the inflated bubbles need someone to fill them regularly. Meanwhile, earth, confined to the silver cylinders, is

visually erased from this field. Detachment from this source of sustenance presents a dependence on maintenance procedures that references the intricate network of service mechanisms we have created to maintain a controlled ecology.

The trellis was originally envisioned airborne without developing a rigid frame or columns. Maintaining the fluidity of the infrastructure was the driving force that caused the structure to be supported by the surrounding tree line. The trellis supports the vines, and the trees support the trellis. Pogue Harrison observes that it is primarily a garden's boundary that sets it apart, that gives shape and delineation to its living form, while it keeps the garden related to the world it keeps at a certain remove (2008). The garden wall in *Buoyant* gives it both shape and structure. It is made of a diaphanous forest and unkempt undergrowth. The location and form of the trees defined height, distance from the main path, and the point at which the canopy started to descend towards the back (Figure 7). Following Worton's Renaissance gardens the trees "outside" the boundary becomes not just part of the composition, but part of the construct in two ways: they create the green-scape inside through reflection, and they literally hold the garden up. As originally planned, the architecture still literally hangs on nature and vice versa giving construction and nature equal agency in the design. Here nature is expected to become an agent rather than just a commodity.

Figure 7. View of tree line and *Buoyant* trellis (photo by R. Baronet)

The garden itself is a representational tool. Free from the requirements of sheltering or production of food, it can begin to represent our desires in relation to the environment we inhabit. *Buoyant* is both a representational structure, and simply a place for reflection or enjoyment. Its design is to engage its visitors and caretakers in a positive rather than positivist reading of the role and the form of our insertion into the environment. As an interdependent construction, *Buoyant* and similar gardens can start to dissolve the perception of the Romantic wilderness so we can see ourselves as part of the community of entities rather than fluctuating from being outsiders to being monarchs of non-human ecologies.

Conclusion

The garden, and this installation in particular, explores the potential of forsaking the conceptual nature/culture divide that has constructed our current reality. Like Edith Worton's Italian Renaissance architect we can again see one *picture* in which nature and art are fused by the harmony (or lack thereof) of the grouping of natural and manmade parts (Harrison Pogue, 2002). Architecture and nature collectively occupy foreground and background. Ecology is no longer relegated to the background or the field for man's actions, but is again acknowledged as an agent. Because it is neither a commodification nor an isolation of *nature* from our actions, but expects collaboration, in this

garden we can imagine infrastructures for a collective ecology of human and non-human actors. This proposes a paradigm shift in design thinking to an ecocentric perspective.

The collapse of the nature/culture divide is relevant for today's architect in the same way that the clear establishment of that separation was important in the Modernist ideology that guided performance, form, and space making concepts for nineteenth and twentieth century architecture. In the sixties, Reynar Banham stated that a new aesthetic needed to emerge to express the predominance of environmental systems that took on the responsibility of managing the new environment in architecture. The value we have found more recently in ecosystems services has moved architecture to integrating landscape components that perform these services, but rarely do we get to cultivate these spaces *with* nature.

Since there is no longer a wilderness to offset the cultural intervention, both the nature-culture dichotomy and the images of unadulterated wild, are under assault by our knowledge of the planet's intertwined ecologies and the role we play in them. The critiques by Morton, Latour, and Pogue Harrison propose new way of seeing again. The garden is an interesting lens from which to address their hybridized world view. A thickened space where culture, biology, science, technology, history, art, and architecture interact, the garden's design is incapable of adhering to the nature culture dichotomy due to the variety of agents. By engaging the model of the garden as the interface between ourselves and the environment, we may realize our coexistence as interdependent agents, rather than succumb to our anxiety regarding the loss of ecosystem services. If we accept man in nature, as landscape urbanism and the garden do, then we can permit man-made systems, including buildings, to perform the arduous task of managing man's impositions without pretense of "naturalness".

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10. PRECARIOUS AND POETIC INTERPRETATIONS OF THE ANTHROPOCENE: RETURN TO NATURE THROUGH BEER CANS, BOTTLES AND FIREWORKS

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Abstract

The collection of coastal refuse becomes a creative exercise, exploring Nature as envisioned in a Top End Australian community. Coastal encounters of anthropogenic perturbation offer a critical examination of the 'local' Anthropocene providing creative direction for an art making practice aimed at relating local thoughts and actions to environmental sustainability. This paper examines the complexities of the Human/Nature nexus as expressed through an art making practice that includes the ecological phenomenon of waste and the relational activity of recycling. Anthropogenic found objects such as discarded drink bottles and burnt-out fireworks casings facilitate a complex return to nature through their changing status; moving from one purpose to another, one environment to another, one meaning to another. Understanding this 'Return to Nature' paradigm allows for a problematisation of anthropogenic found objects and events in order for nature and culture to be defined within a mutually dependent sphere. Critically these objects of encounter speak to an interconnection of mimicry and materiality and invite new creative interpretations though augmentation and installation art. Ultimately these new envisioned Natures need to expand beyond fixed events and lexicon into a continuum which allows endpoints and new beginnings but significantly enabling these to exist within bigger systems over time and space.

Keywords: Human/nature nexus, coastal communities, site interventions, gallery installations

Introduction

Walking along the beach today is an active pursuit undertaking changes of lexicon from Nature Reserve to fishing spot, Traditional land to recreational zone (to name but a few). With each affect comes a myriad of processes and behaviors not just for the visitor but also for Nature itself. The beach, or to be more expansive, the littoral zone including intertidal mangrove environments, has become a socio-ecological hotspot. This land sea borderline articulates the dichotomy of nature and culture, within a framework of use and identity. Here anthropogenic disturbance is seen at a local or regional level. It is the "pulse" disturbance of community events and attitudes; the annual Darwin Beer Can Regatta or firework celebrating Territory Day, the weekend fishing trip or sunset drinks. Short-term disturbances to natural communities reveal the suggestive and contingent status of anthropogenic events and their enduring presence within the environment (beer cans, spent fireworks casings, plastic bottle, thongs, plastic straws etc.). The value systems placed on these events are entwined with different perceptions of Nature and are relative to notions of preservation and neglect.

This paper explores the nature of anthropogenic found objects from collection, discovery and augmentation into installation art. Repeatable visits to particular sites along the Darwin coastline enable observations about anthropogenic event and their subsequent detritus. Discoveries are processed following the philosophical imperative to make distinctions between 'objects of encounter' and 'objects of recognition' (O'Sullivan, 2007, p. 1). An object of encounter is an object of becoming, rich in imaginings and creative extrapolation. This object is meshed in the fabric of the environment as a mimetic force and provides a return to nature that is inclusive of the human agency. Augmentation of the anthropogenic found objects and subsequent installations explores Naturing as a creative devise. Expanding on encounters of anthropogenic found objects within the greater ecological surround, artworks are made to engage with a continuum of meanings and to explore new thought about

consumption and destruction of our Natural environment.

Problematising anthropogenic found objects

As an artist working within a local trajectory the precarious process of meaning when envisioning Nature challenges me. Witness to and participation in post-event clean ups have provided me with an artistic practice which engages with thoughts on environmental harm and notions of sustainability. Clean-ups offer a demarcation between Nature as experienced by humans and Nature as Ecology. Drink bottles and beer cans entangled in mangroves (Figure 1) or discharged fireworks left behind on the beach after a night of celebration (Figure 2) provide residual evidence of our desire to envision Nature as a resource to be exploited; a theatrical backdrop to the main event of our lives.

Figure 1 Bottles in the mangroves, Casuarina Coastal Reserve, July 2011

Figure 2 Day after Territory Day, Casuarina Beach, 2 July 2010

Problematising anthropogenic found objects and events for an environmental agenda means the relational aspect of nature and culture are defined as a mutually dependent sphere. Thinking ecologically provides an inclusion of humans in the definition of Nature by decentering the human subject as 'operator' of the world. In this reading 'ecology' refers not to the classification of species but to the:

> Interrelation and interaction between and within species and the diverse biochemical and geophysical properties of their habitat (Conley, 1997).

The challenge is one of self-awareness and knowledge building in order to interrelate and interact between and within community events and attitudes: expanding envisioned Natures beyond the fixed end point of a single event with its reductive hierarchy of before and after; composing within a continuum; allowing endpoints which trigger new beginnings, but significantly, enabling these to exist within bigger systems over time and space.

Ultimately local thoughts and actions must undergo transformative relationships with Nature through collective and individual experiments. This engendered local thought is not a fixed entity -- rather it is about repeatable or reusable conditions that invite changing viewpoints and expansive ways to think about our world.

This ambitious learning trajectory is an active experimentation that engenders the local in the culturalisation and naturalisation of anthropogenic actions and objects (Welt, 2013) through creative participation with the ecological phenomenon of waste and the relational activity of recycling a new metanarrative with Nature.

As they are found

While we may rile at a littered beach post fireworks celebrations, refuse which has meshed with the environment over time presents an anthropogenic disturbance of disguise. Discoloured by mangrove mud or deteriorated through tidal currents and wave force, as recognition dissolves, anthropogenic objects uncannily exist in a between state of equivalence. Nature has becomes Water Benjamin's 'true collector' so that:

> The object be dissociated from all its original functions in order to enter into the closest possible relationship with its equivalents. (Krauss, 1999, p. 38)

Figure 3 & 4 are images of flotsam and jetsam at Fannie Bay in Darwin, Northern Territory. They provide evidence of human disturbance expressed in a mimetic relationship with the coastal environment. When considering the materiality of abandoned objects, equivalency can be seen in objects that have been used by the environmental over time. Here equivalence relates to corporality and life cycles. The crumbled and faded beer can precariously and poetically align with the ocean coral, sponges and mangrove seeds rather than the drinking population of the Northern Territory.

Figure 3 Discharged firework at Fannie Bay Beach. Taken 13 Oct 2012

Figure 4 Beer can at Fannie Bay Beach after monsoonal storm. Taken 12 February 2012

Natural effects created by humankind are not unfamiliar. Since twentieth century industrialisation however the perceptions of Nature as original and instructional provides a persistent credence:

> [Nature] can be read, deciphered, and mirrored by humanity in the laws it posits and the conceptions of the body it hold (rational, wilful, responsible, introspective). (Halsey, 2006, p. 53)

For the Anthropocene, a new era of human forming Nature, the sublation of dichotomies such as human/Nature or teacher/pupil is manifest. The laws and concept of the body are negated by mimetic force. Without the distinction between humans and Nature, equivalence provides a precarious and poetic vision.

Augmentation

Clean-ups provide informal environmental monitoring, analysing cultural and ecological factors. Objects collected for *Runoff* installation in 2012 were found after the natural disturbance of a wet-season storm. The intensity of the storm dislodged aluminium cans in varying states of decay from their home amongst the coral and sponge communities. Many of the cans were augmented by coral and crustacean growth and alerted me to the complex dynamic of materiality resonate within a becoming Nature. As Latin American artist Guillermo Calzadilla states,

> … a material is never simply self-evident in its meaning; it is always marked with histories, cultures, and politics that are at once irreducible to and indissociable from the material in question. Any material is going to have the weight of history inscribed in it. The time of the world is there; geologically, geopolitically, there is always an allegorical dimension to materials. (Falguières, 2007, p. 33)

Michael Taussig's book Mimesis and Alterity looks at the two mimetic forces which intertwine human and Nature with imitation,

> like produced like, or that effect resembles its cause (Taussig, 1993, p. 47)

and secondly,

> that things which have once been in contact with each other continue to act on each other at a distance after the physical contact has been severed. (Taussig, 1993, pp. 52-53)

These principles of 'copy' and 'contact' have been realised in installation and clean-up projects including exhibitions such as *Thales Touch* 2011 (Figure 5) and *Runoff* 2012 (Figure 6). The anthropogenic found objects are augmented with sculptural paper forms and flows mimicking the natural assemblages and relationship between inorganic and organic that appear along the shoreline.

Figure 5 Installation view from *Thales Touch, Nan Geise Gallery, Charles Darwin University, Darwin, NT, June 2011*

Figure 6 Installation view from Runoff,
24Hr Art Northern Territory Centre for Contemporary Art,
Darwin NT July 2012

The physicality of paper combines with environmental conditions to directly connect with Nature though process. It is a changeable material both physically and conceptually. It can be solid and liquid, hard and soft, wet and dry. It can be folded, crushed and dissolved. It can hold and cover, be dyed and printed on. Paper has multiple transformations which ultimately signal its own organic fragility and eternal state of change. Combined with augmented paper forms, anthropogenic found objects create branching chains, linking the singular with the multiple, and address the equivalency of the human/Nature nexus through a new narrative and a new culturalisation of local objects.

The notion of learning is directly aligned with the process of meaning. For Gilles Deleuze this process is an encounter, an event, dynamic in its working towards a real transformative relationship (O'Sullivan 2007 p.1). Meaning is not based on 'identity thinking', but rather a "material process, the expression of one force on another" (O'Sullivan 2007 p.21). Naturing or Becoming Nature exists within a living reality, constantly becoming or metamorphosing into something else. To augment creatively is to continue this process and to provide a link between past, present and possible futures.

Conclusion

It is significant that views of Nature vary greatly and have done so since the beginning of humankind. The phrase 'returning to nature' provides the obvious questions: 'What does nature look like?' and 'What is the nature we return to?' In trawling the beach and mangroves for materials that do not belong I have participated in a critical analysis of the human/Nature nexus and reflected on a Nature enacted and participated in by the Darwin Community. Through this process I have dismantled certainty about how the environment works in order to create new thought about the ecological phenomenon of waste and the relational activity of recycling.

In a time when natural cycles can be made redundant through technological innovation and human interaction with the environment appears to be increasingly defined by the dichotomies between nature and culture, science and politics, notions of Nature and Naturing (becoming nature) are critical to our definitions of self and our subjective choices as individuals of a global environment. Understanding the 'Return to Nature' paradigm allows me to understand my local community as related to as a

practicing artist. It centralises the importance of community engagement with my artwork and places my research at the point of interaction and understanding with our natural environment.

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11. TRANSCENDING THE DISCIPLINES: TEACHING FOR THE UC DAVIS ART SCIENCE FUSION PROGRAM

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Abstract

Multidisciplinary education programs that fuse the arts and sciences are necessary for today's generations of learners who are faced with complex global issues including climate change, cultural extinction and environmental destruction. These challenges are overwhelming and difficult to dissect. To mentally navigate such important topics, one must possess the ability to link concepts from an array of disciplines to create a clear thought process that questions and criticizes. We must be able to think creatively, invent new approaches for solving problems, and collaborate with others. These learning techniques need to be present in the classroom. Fortunately, a movement is happening that transverses the disciplines of art and science, creating an intellectual borderland where their shared creativity and pursuit of discovery is united. The UC Davis Art Science Fusion program is at the forefront of this movement empowering students to synthesize big ideas, become creative thinkers, and to be mindful of the fragility of our environment while intrigued by the species that inhabit it. This undergraduate program includes classes fusing art with entomology; photography with physics; and environment with song. The program emphasizes experiential learning, taking lessons from science and creating works of art.

Keywords: Art Science Fusion, education, entomology, experiential learning, found object, cabinet of curiosity

Introduction:

Trans-disciplinary education programs that fuse the arts and sciences are necessary for contemporary learners who are faced with today's complex global challenges. The UC Davis Art Science Fusion program is at the forefront of a movement empowering students to synthesize big ideas, become creative thinkers, to be mindful of the fragility of our environment and intrigued by the species that inhabit it.

I am a member of Generation Y, also known as the Millennial generation; a demographic of today's late twenties and early thirty-somethings. We were born into a world already faced with great challenges, but it feels as though our current situation is remarkably more complex and on a scale much greater than we are of capable teasing apart. Hunger, disease and economic disparity are problems with which humanity has long been faced. But today there are additional challenges that are particularly grave and persistent including climate change, cultural extinction, over population, and environmental destruction. These are not problems scientists will solve alone, nor will economists, or historians, humanists or artists. These are complex problems that demand multi-faceted approaches from an array of trans-disciplinary thinkers and doers.

The rate and impact at which these challenges evolve is moving faster than society is able to process. It is impossible to keep pace with the rapid advancements in technology, much less stay informed about each pressing problem and bring to bear promising solutions. But what we *can* do is learn how to question and how to link ideas into a cohesive, meaningful thought process that can be applied to situations with which we are confronted. As teachers and learners, we need to think critically, to formulate intelligent questions, to have informed opinions, and to question our own assumptions. We

need to think beyond our conventional ideologies and invite new perspectives. We need to be equipped with the ability to draw information from many disciplines, and to synthesize that information to begin to visualize the deeply rooted contradictions of our modern, globalized world. When working on a problem, we must be able to think creatively, *invent* new approaches and collaborate with others. As science teachers, we need to develop and employ educational models and learning programs that relay information while encouraging creativity allowing students room for and the ability to practice creative thinking. Fortunately, a movement is happening which aims to overlap the disciplines of art and science, creating an intellectual space where their shared creativity and pursuit of discovery can unite. It is in this space that a new way of thinking, creating, learning and teaching is spawned.

The UC Davis Art Science Fusion Program:

The Art/Science Fusion Program at Davis is a trans-disciplinary program that enables scientific learning through the use of tools from the arts. Collaboration among design and science faculty, museum educators, professional artists, UC Davis students and community members comprises this program that offers a new paradigm for experimental learning. The program is based on a teaching and learning model that combines lectures or workshops that present scientific concepts with site-specific contexts (artistic, scientific cultural and their interfaces) and hands-on experience with artistic mediums (e.g. ceramics, painting, textiles, sculpture, photography, performing arts, song writing). Founded by UC Davis Entomology Professor Diane Ullman and nationally-known ceramicist Donna Billick, the program offers students and community members the opportunity to learn and practice art and science in hands-on, project-based setting (http://artsciencefusion.ucdavis.edu).

Art Science Fusion Program's Mission statement:

The UC Davis Art/Science Fusion Program's mission is "to bring the creative energies of the arts and the sciences into a mixture that catalyzes change and innovation in learning for people of all ages. Described by E.O. Wilson as 'a spearhead for future creative work in the intellectual borderland,' the program is a portal into a new creative territory in which people observe the world around them with fresh eyes, testing their ideas and transforming those ideas into new concepts and new insights" (http://artsciencefusion.ucdavis.edu).

Figures 1 and 2. Entomology Students learning about honey bees before starting on their public mosaic art piece in the Honey Bee Haven at UC Davis. Photo credit: Donna Billick.

The UC Davis Art Science Fusion program includes many classes. Some examples are described below.

- **Photography: Bridging Art and Science.** Offered by Atmospheric scientist, Dr. Terry Nathan, this class uses photography to explore the commonalities shared by art and physics. Topics include the artistic and scientific roots of photography; principles of space, time and light; composition in the visual arts; aesthetics and the geometric foundations of art and

science; and photographic interpretation of the environment.

- **Earth, Water, Science and Song.** Lectures in this class **(**taught by Dr. Wendy Silk from the Department of Land, Air and Water Resources) describe water movement on earth, the natural history of soil formation, nutrient cycles, and resource management to sustain human and natural ecosystems using case studies. Lake Spafford and Putah Creek on the UCD campus are living laboratories that compliment the lectures. While in the studio, students communicate scientific concepts through song writing and poetry.

- **Freshmen Seminar 2: Plants in Art and Science.** This class, taught by Botanist Dr. Judy Jernstedt, explores plant diversity, plant defences, and reproduction in the context of the history of plant art and artistry. Topics also include plant form and development and the benefits of plants to humans. Based on newly obtained botanical skills, students create a textile surface design illustrating the evolution of plants on the planet (http://artsciencefusion.ucdavis.edu).

Entomology 1, Art, Science and the World of Insects:

Offered by Entomologist, Dr. Diane Ullman in partnership with Artist Donna Billick, this course explores the magnificent world of insects with a focus on the biological components that allow insects to be successful evolutionarily, and consistent contributors to human technology, culture, architecture, religion, film and literature. This class consists of two parts, focusing on insects; a lecture portion held twice per week followed by a three-hour "labudio" (a fusion of a laboratory and studio). In lectures, students are introduced to topics such as insect anatomy, physiology, culture, and human/insect interactions. The students are assigned to one of three "labudios" during which, they create an art piece that interprets an entomological concept or story. Currently, these three studio sections are: ceramics/mosaics, painting, or found object and sculpture. In the first weeks of the labudio, students are introduced to the history of their medium and basic concepts in art theory and composition. The class is assigned a themed public art project, but each student is responsible for his or her unique component. Students research their topic and present their project through writing and in-class presentations before sketching their ideas. Students then translate their scientific research into an artistic masterpiece. At the end of the quarter, the piece is assembled and installed.

The Labudio Up Close:

I teach the found object and sculpture labudio section of the Entomology 1 class. Students apply lessons from the lectures to their studio section, which includes research, creative writing, reading, and sculptural art pieces made from found objects. This year's project theme was "Cabinets of Curiosities." Popularized by affluent Europeans in the 14th and 15th centuries, such cabinets were displays of one's unique collections of oddities and treasures that featured the most unusual and curious. Cabinets of curiosities can be viewed as precursors to the natural history museum, born during the age of discovery and before Carl Linnaeus[9] developed a taxonomic system of classification in the 18th century.

We created a cabinet of curiosity that revolved around the peculiar world of insects. The cabinet houses glass drawers, much like the ones found in an insect museum, which became each student's own original art piece. At the start of the quarter, students developed a story about insects that highlighted something so strange or fascinating that it was *almost* unbelievable, a task inspired by

[9] Carl Linnaeus, a Swedish botanist and known as the Father of Taxonomy invented the system for naming, ranking and classifying organisms that is still used today. In 1735, he published the first edition of his classification of living things, the *Systema Naturae. (*http://www.britannica.com/EBchecked/topic/342526/Carolus-Linnaeus).

David and Diana Wilson and their unique museum, The Museum of Jurassic Technology in Los Angeles, California[10]. After students identified their entomological topic, they researched it by sifting through reference books, current literature and historical folktales on which they based their story. Students became intimately familiar with their species of interest by visiting the Davis Bohart Museum of Entomology where they observed and drew specimens under the microscope. The action of creating drawings of the specimens they observed forces the students to pay close attention to anatomical detail and function. Based on the student's story, and inspired by assigned readings, the students' final project was to create a work of art that illustrated their story and demonstrated their scientific understanding. At each step of this creative process the students presented their research to the class through presentations, giving the students the opportunity to teach the science they have learned. Students also engaged in routine critiques of each other's artwork, which allowed for reflectivity and student-to-student communication. The ability to articulate constructive criticism and even more so, the ability to receive it, is of course important in any discipline. Having critiques allowed students to exercise artistic vocabulary while discussing creative ways to accomplish their art piece as a group by exchanging new creative ideas and methods as a group.

The students who participated in this labudio approach demonstrated a far greater attention to and awareness of biological detail and process compared to students in a traditional lecture class as exhibited in their art pieces. This is due to the time spent in front of the microscope making drawings as well as physicality of replicating their insect and it's environment. The act of working with their hands and recreating anatomical structures and environments instead of only just being mentally aware of a concept helps to embed the scientific message. Because students take ownership of their own creative process and art piece, the students naturally become invested and engaged.

Figures 3 and 4. Left: Student Edna Chen holding up her art piece. Right: The cabinet of Curiosities made from synthetic fur, moss, lichen, antlers and many small insect specimens.

The End of the Quarter Exhibit:

At the end of each quarter the students exhibit their work in a gallery open to the public. This exhibition serves as a final goal and one final push to produce and take pride in quality work. In most cases, this is the student's first time ever exhibiting artwork in a public professional setting. In 2012, I opened the show up to professional artists and scientists to submit additional works. The show was

[10] The Museum of Jurassic Technology is located in Los Angeles, California was founded by David and Diana Wilson in 1988. This museum's collection includes a mixture of artistic, scientific, ethnographic, historic, as well as some unclassifiable exhibits. The factual claims of some of the exhibits may lack credibility, which evokes a similar spirit to 14th and 15th century cabinets of curiosities (Weschler, 1995).

titled "ORGANISM: An art show combining Science, Art and Technology." In addition to the 16 students who contributed to the Cabinet of Curiosities component; one performance artist, one sound artist, six visual artists and four scientists submitted art pieces made or inspired by science. The artworks were created from a variety of media including human hair, snakes, fungus, bones, silk worm cocoons, glowing *E. coli,* and a principle component analysis based around a tomato genome that when plotted, produced music[11]. This exhibit catalyzed excited conversations between artists, scientists, and the community. Connections were established between performance art, music, visual arts and science.

Figure 5. Some art pieces exhibited at "Organism: An art show combining Science, Art and Technology" Photo credits: Tree Kilpatrick (lower right) and Brad Townsley (lower left and middle).

Applying the Labudio Approach to Educational Models

Learning style is an individual's natural pattern of obtaining and processing information, which is of

[11] Created by plant biologist Dr. Dan Chitwood of UC Davis, *Tomato Gene Expression, Op. 1* (Figure 5, middle), is a piece created from "more than 20,000 gene expression patterns across six different tissues in domesticated tomato (*Solanum lycopersicum*, cultivar M82) and a distant wild relative that comes from the deserts of Peru (*S. pennellii*). On the right side of the piece are the expression levels of the genes in inflorescence, leaf, root, seedling, stem, and vegetative apex tissues. On the left is a principal component analysis which reduces the six dimensions of tissue into two, informative dimensions (the principal components). Pitch corresponds to principal component 1 (PC1) and duration to PC2. The movements correspond to groups of genes with similar expression patterns. A technique called self-organizing maps was used to discern these gene groups/movements. This piece was composed using R, and the packages ggplot2 and playitbyr (D. Chitwood, personal communication, 15/12/2012).

course, different for everyone. The Experiential Learning Theory (ELT) is learning style model developed by David Kolb (1984). This model incorporates two related approaches to obtaining experience: Concrete Experience and Abstract Conceptualization, as well as two related approaches toward transforming experience: Reflective Observation and Active Experimentation. According to this model, the successful learning process engages all four of these components. Students often excel in one or a combination of these. The Art Science Fusion program engages each one of these components. Abstract conceptualization is made possible by the information and ideas proposed to student through class lectures, readings and writing assignments. Concrete experience occurs for example, during field trips or during microscopic study of specimens. Reflective observation is practiced during writing, presentations and critiques. Finally, active experimentation occurs during the art making process.

Neil Fleming's VARK (Visual, Aural, Read/Write Kinesthetic) model based on Stirling's earlier VAK model (1987), of learning is one of the most widely-used categorizations of learning styles including visual learners, auditory learners and kinaesthetic or tactile learners. Visual learners (V) have a preference for seeing (pictures, graphs, visual aids such as slides and handouts). Auditory learners (A) best learn through listening (lectures and discussions). Others prefer to learn through information written in print (R). Tactile/kinaesthetic learners (K) prefer to learn by experience (touching, experimenting, creating). All of these approaches to learning are practiced in our program making learning accessible to everyone, and giving students a chance to practice each learning style to become great learners.

Conclusions:

When Science, art, and technology are brought together, whether in the classroom, or in the gallery, people are inspired to think on a broader scale and are encouraged to make connections between ideas. Art inspired by or made from science can of course stand-alone, as art itself with no "job" to do. But tools in the arts can also be used to communicate scientific concepts. Being a student of both disciplines however, is a powerful combination. Through educational programs like the UC Davis Art Science Fusion program, students are empowered to synthesize big ideas and be creative thinkers. They are mindful of the fragility of our environment and intrigued by the species that inhabit it while appreciating the resources that sustain it. The students who possess the ability to question, to think creatively, to experiment and invent, will be those capable of contributing to the mitigation of the aforementioned challenges with which we are faced.

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12. ANASTATICA SENSIBILE: A CASE STUDY ABOUT NATURAL PROCESSES AS MEDIUM FOR INTERACTIVITY

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Abstract

Interactive artistic installations, especially the ones exploiting digital technologies, represent an active area of research both from the artistic and technological sides. These works are able to detect different properties of people in the environment (e.g., motion, localization, gestures) and determine their behaviour accordingly; for example, modifying sounds and lights. Manifold installations have been realised, exploiting audio-visual elements as key media for interactivity. This paper presents a case study of a non-conventional interactive installation ("*Anastatica Sensibile"*), which has been conceived around a natural process. In this installation people determine the life cycle of specific plants, in terms of an opening/closing process. The contribution of the paper is in stimulating reflections about how the plants' natural life cycle can become the fundamental element of an interactive artistic installation.

Keywords: Interactive installations, natural processes, physical computing, interactive design

Introduction

Artistic installations (Oliveira, Oxley, Petry, & Archer, 1996) are powerful interventions for promoting the participation of people in existing spaces. They are artworks consisting of several elements distributed within a physical space. Specific settings (e.g. walls, floor, lights) are used as part of the composition. Viewers are able to move around the works and interact with them, so that they become part of that work in that specific moment in time. Artistic installations re-shape spaces in new ways, re-appropriating spaces to their own artistic ends (Bestor, 1996). In *interactive artistic installations* (Fox & Kemp 2009, Paul 2008, Bullivant 2007, 2006) viewers become *active participants* that determine the behaviour of the installation.

With the technology improvements over the years, artists are now able to create installations involving *sensors* (e.g. touch sensors, motion sensors) and *actuators* (e.g. lights, monitors, mechanical parts), providing a rich and seamless form of interactivity. Lights, sounds and videos are elements that have been widely exploited in interactive installations contributing to the forms of interaction: the behaviour of the audience may determine the behaviour of these elements. For example, lights may follow the paths of the people, while sound and videos may be modulated according people's localisation (Bullivant 2007, 2006). This paper presents and discusses an interactive installation; *Anastatica Sensibile,* which was built in the beginning of 2012, for the Sant'Elmo castle in Naples, Italy. It is based on a non-conventional form of interaction, centred on a natural process. The goal of the paper is in stimulating reflections in the context of the debate about how avant-garde forms of Arts, especially ones exploiting digital technologies, may acts as a catalyst for promoting human awareness with respect to Nature-based topics. The paper is organised as follows: Section 2 presents the installation, Section 3 discusses the artistic aims and several conceptual aspects and finally, Section 4 draws out some conclusions.

Anastatica Sensibile

The Natural Process

The *Anastatica Sensibile* installation has been conceived around the properties of a specific plant species, the *selaginella lepidophylla*. It is a species of desert plant noted for its ability to survive in almost complete desiccation. During dry weather in its native habitat, the plant's stem curls into a tight ball. However it can be revived with only a little water. After wetting, the plant turns green in about one day, hence the name of "resurrection plant". The closing/opening process may be achieved also in our common environments. If the plants are not irrigated for a few days (one or two days according to the environmental conditions), they curl as in Figure 1. Irrigating them with a small glass of water re-activates the plants, they then turn green and re-open in one or two days, as shown in Figure 2.

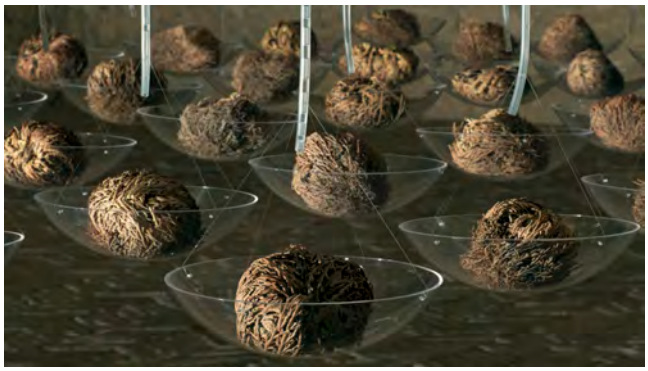

Figure 1: Selaginella lepidophylla *before irrigation*.

Figure 2: Selaginella lepidophylla *after irrigation.*

The Installation

The installation called *Anastatica Sensibile*[1] consists of a wooden platform with forty-five Selaginella lepidophylla plants held up by transparent PVC pipes that are connected to a common water tank (Figure 3). Every pipe is also equipped with an LED on the top. Every plant is provided with a small base able to accommodate the water as shown in Figure 1.

A digital system monitors the number of people around the installation. When the number significantly increases, one plant is randomly selected: the LED of the selected plant blinks for ten seconds. When a plant has been selected a certain number of times, the digital system irrigates the plant and its LED is turned on. Once irrigated, the plant starts regenerating itself: it will be completely open within approximately one day. An irrigated plant is excluded within the selection process, for approximately four days, a time sufficient for the plant to regenerate itself and then to return to the "closed" state because of the absence of water. After this period, the plant becomes re-selectable and the LED is turned off. This discontinuous mode of irrigation ensures all the plants never "blossom" at once, but only some, and these are in close correspondence to the number of attendances or visitors.

[1] The title may be translated in English as "Sensitive Resurrection". The word "Anastatica" derive from the Greek ανάσταση, resurrection.

The plants which have not been watered will remain closed until the next increment of people. Thus, the influx of people determines how fast the garden comes to life and becomes lush.

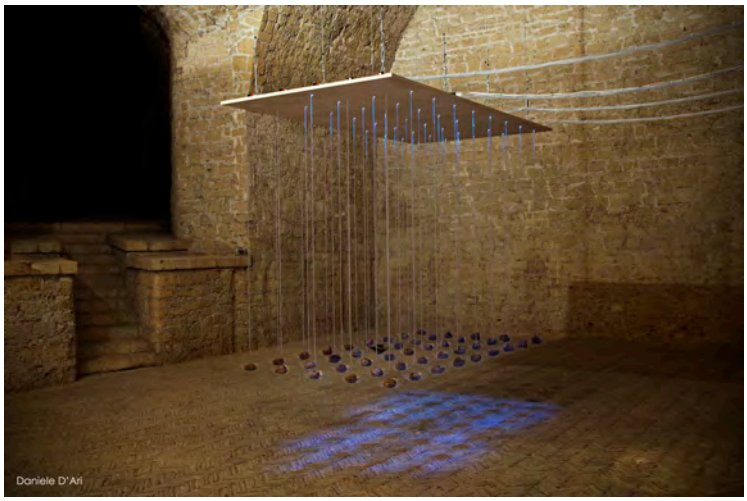

Figure 3: Anastatica Sensibile (photo courtesy of Daniele D'Ari).

Realisation

Figure 4 shows the main hardware components employed by the installation.

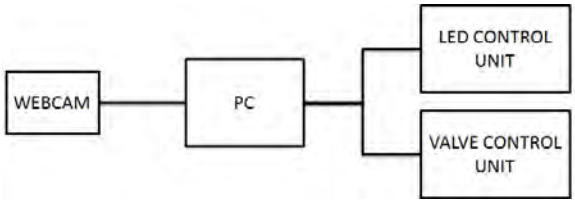

Figure 4: Physical components of the digital system which manages *Anastatica Sensibile.*

A webcam monitors the people-presence within the room. Two electronic control units allow the management of forty-five LEDs and forty-five electro-valves.

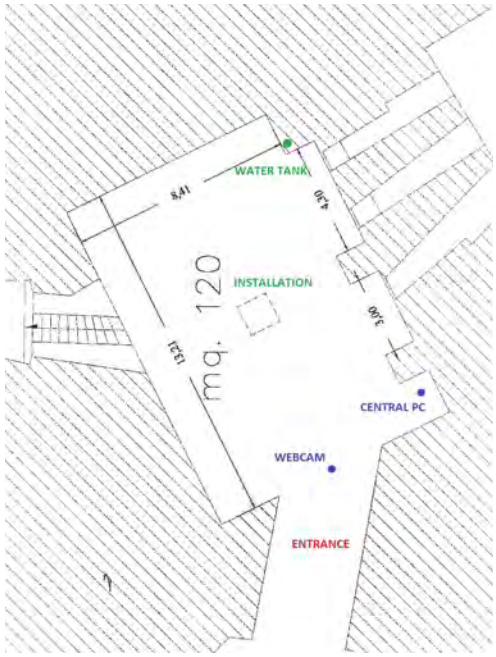

Figure 5: Positions of the installation components.

The webcam is positioned on the top of the entrance of the room (Figure 5). The electronic control

units are mounted on the non-visible side of the wooden platform of the installation (Figure 6). Webcam and electronic units are connected to a central PC, running ad-hoc software, which manages plant selection and activation.

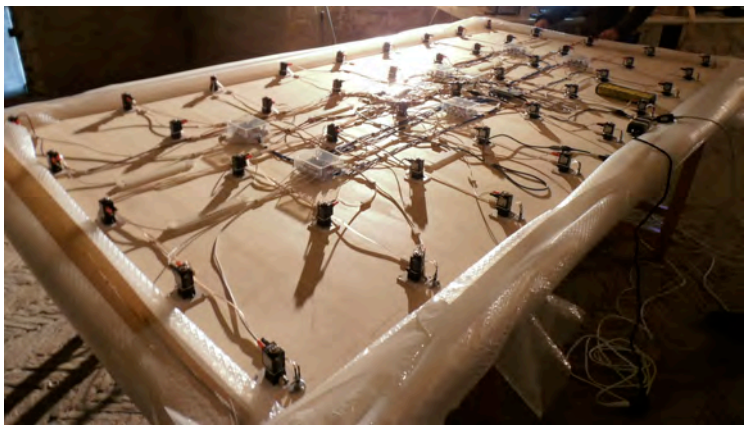

Figure 6: The back-end of the wooding platform hosting the electronic units for commanding valves and LEDs.

Each electronic unit is realised by an Arduino Mega microcontroller plus a specific, self-made Printed Circuit Board (PCB). Each pipe enters into one electro-valve connected to the water tank (Figure 7). The valves are normally closed. The irrigation of a plant is performed by the valve opening for a specific number of seconds.

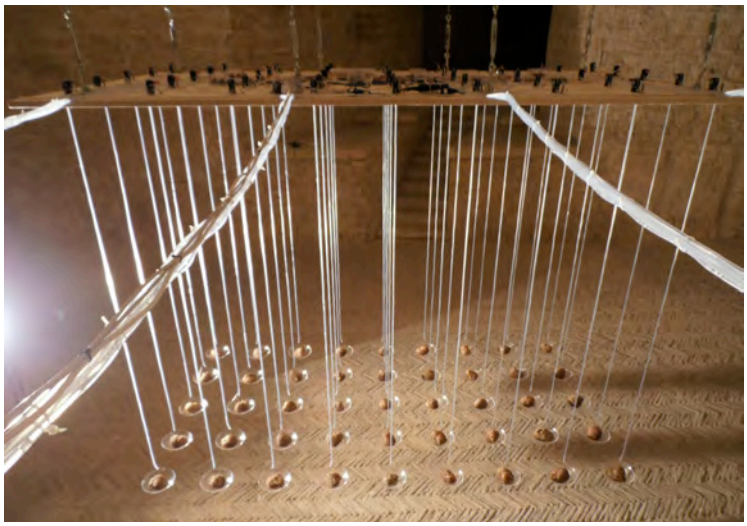

Figure 7: The connection among pipes and valves.

The technique of "people monitoring" is represented in Figure 8. The system exploits a custom implementation of the computer vision method, proposed by Jabri et al. (Jabri, Duric, Wechsler, & Rosenfeld, 2000), to determine how many people are around the installation.

Figure 8: *Monitoring of visitors.*

The plant selection & activation process is managed by the system, as follows:

1. Counts -- once per second, the number of people in the room, by analyzing the images taken by the webcam; as shown in Figure 8.
2. Verifies -- once per second, if the current number of people is greater than the weighted average of the number of people counted in the last 60 seconds, compared to a fixed percentage rate.
3. If the condition in step 2) is not verified, the system resumes from step 1).
4. If the condition in step 2) is verified, the system:
    i) Randomly selects a plant from a collection of nine plants, determined on a daily basis. Every day, this set is re-determined in order to consider different plants from the previous ones.
    ii) If the plant has not been irrigated in the previous 4 days, the system:
        (a) Updates the number of selections for the identified plant.
        (b) If the number of selections for the chosen plant is less than a fixed threshold, the LED blinks for a predetermined time.
        (c) If the number of selections is greater or equal to a fixed threshold, the selected plant is irrigated: the corresponding valve is opened for a time to allow the discharge of approximately 75 ml of water. In addition, the LED of the irrigated plant is switched on. An irrigated plant is excluded from selection until 4 days after the previous instance of irrigation; after this period, the plant becomes selectable, the LED is turned off and the number of selections for the plant is set to 0.
5. If the plant was irrigated within the previous 4 days, the system resumes from step 1).

A limit of nine activable plants, per day, has been introduced in order to avoid the possibility that a high influx of people could activate all the plants in the same day. All of the identified thresholds can be changed in the initialisation of the system. Finally, it should be highlighted that the control algorithm has been defined in collaboration with the artist and technologists.

Discussion

Artistic Intention

The artist's research is strongly focused on the relation between humans and Nature. Digital technologies have given her the possibility to work on groundbreaking, interactive artworks that may stress the apparent dichotomy between natural and artificial artifacts. In *Anastatica Sensibile,* the audience determines how and when the garden comes to life. In this relationship, water acts as an

intermediary in a fundamental exchange that triggers a virtuous loop of reciprocal nourishment.

There is also a symbiosis between thirst for knowledge and the natural thirst of water. These two concepts of needs, presented in the installation, make technology an instrument rather than an object, demonstrating how the artistic creative process dominates the productive one. Human beings give life with their presence, through irrigation that is both a natural and artificial process, at the same time. The accountability of the public is in close connection and is established between them and the work itself. It's only through people's actions, measured thanks to technology, that the revival of the work will be guaranteed (in both an artistic and aesthetic sense).

In addition to the artist's desires; the visitors, through their attendance, take care and preserve the work over time. There is a particular ecological nuance that emphasizes the most critical interaction between human knowledge and mother nature's preservation; or rather between progress and sustainability. Thus, *Anastatica Sensibile* establishes a connection between artistic practice and phenomenology of everyday life.

The Slowness of the Opening Process

As has already been stated, the *selaginella lepidophilla* takes some hours to completely open after irrigation, generating delay in the causality between bloom and people flow. On the other hand, the irrigation process is fast and silent. The slowness of the natural processes entails new types of interactions. In this sense, the installation is an example of the Slow Technology Vision, identified by Hallnäs & Redström (2001). According to this approach, technology should stimulate reflections and moments of mental rest rather than efficiency in performance. But slowness in *Anastatica Sensibile* comes as a result of the blooming process, allowing nature to re-appropriate its life rhythm.

Audience Feedback

The installation was shown during May 2012. Two key considerations can be reported from the feedback of the audience. In some cases the contribution from the people influx in relation to the plants' lifecycle was not fully understood. People "guessed" that their presence activated the LEDs and that they were involved in a relationship of sorts with the plants, but the actual relationship was only fully realised after reading the description of the work. This is a typical side-effect observed for Slow Technology Applications (Hallnäs & Redström, 2001). On the other hand, the audience appreciated the installation itself, especially in relation to its site (a castle). The adoption of plants and their exploitation in the overall installation has been perceived to have "highly aesthetic" values, even though the participants may not have fully understood the interactive process behind the work.

Related Work

Numerous examples of interactive installations have been proposed by several artists, architects and designers (Fox & Kemp 2009, Bullivant 2007, 2006). They range from adaptive light installations in museums and urban spaces to installations employing sophisticated mechanical actuators. For example; Camille Utterback's *Abundance* ("Camille Utterback web home page," n.d.) is an installation where different-coloured patterns are projected onto the City Hall building of San Jose (California, USA). Variable events are actuated, according to varied factors relating to people and their movement within the installation: their location and whether they move alone or in groups. Michael Fox's *Bubbles* (Fox & Kemp, 2009) is an adaptable spatial pneumatic installation at an urban scale. The installation consists of large pneumatic volumes that inflate and deflate in reaction to the visitors on the site. Compared to these works, *Anastatica Sensibile* is clearly original because it exploits a natural process for creating interactions with the audience.

Other researchers have exploited plants and vegetal forms in Architecture, Design and Arts. Patrick Blanc's *Vertical Garden* (Patrick Blanc's web page, n.d.) is famous for realising the so-called green walls/vertical gardens. They are partial facades of buildings that are partially or completely covered

with vegetation. *Interactive Plant Growing*, by Christa Sommerer and Laurent Mignonneau (Sommerer & Mignonneau web page, n.d.) uses living plants as the interface, affecting a 3-D animated plant environment when it is touched or approached by humans. Other digital-based works take inspiration from natural and biological phenomena for different results; for example; the 2012 edition of the Transnatural festival[2] included a section for digital artworks, which exploit genetic algorithms; i.e., computational techniques that mimic biological/evolutionary processes. Even with respect to these works, *Anastatica Sensibile* is original because the natural process is exploited at an interactive level.

Conclusions

We think that our experience may provide a useful experimental case study on research practice at the intersection of Arts, Technology and natural processes. Moreover, we hope that the development of the installation may stimulate reflections about the role of the Arts in relationship to our contemporary needs. We have endeavoured to develop a system whereby technology can take care of both life and nature. In this role, humans give their contribution in a largely unconscious manner. Via *Anastatica Sensibile* and the process undertaken within this project, it is hoped that the significance of nature preservation is subtlety relayed via the instrument of Art.

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[2] http://www.transnatural.nl/

13. PARADOX IN SCULPTURE: HYPERMODERNITY, NATURE, AND DIGITAL MEDIUM

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Abstract

Artistic creation has mutated from its introverted nature to become a collaborative act merging the scientific and artistic domains into an extroverted process of creation. Referencing research creation, we explore sensory knowledge inspired by environmental concerns ranging from ecological to technological perspectives. The artwork "Vulnerable: The Salmon Project" addresses the condition of our natural environment and aims to create an awareness in the viewer of questions of sustainability. The sculpture installation project proposes opposing temporal forces—a 3D digital and technological approach as a mode of production, in opposition to an ecological statement on the vulnerability of the living environment—which stresses the values of an hypermodern society, evoking a culture of paradox. Hypermodernity also reflects an economic context which emphasizes the value we bring to tradition, as a need to safeguard our heritage. The sculpture discourse focuses on the vulnerability of the salmon species, a Canadian icon, perceived as a metaphor for the human condition. This paper explores the ways in which artists adapt to new ways of experiencing 3D in an hypermodern epoch where space-time and materiality are greatly affected by the growth of digital mediums.

Keywords: Sculpture, nature, digital medium, environment, sustainability, hypermodernity, technology, Science, creative process

From Modernity to Hypermodernity

The technological era that influences the way we perceive a work of art is subject to socio-cultural changes and technological advancements in our society (Benjamin, 2008). Through research creation perspectives, this paper draws a parallel between the ways in which digital media[1] affect our socio-cultural point of reference and the paradoxical impact and tension within the mode in which a 3D digital and technological medium affects the way artists experience space, time and materiality.

To approach the study of the impact of a 3D digital medium[2] on the artist's creative process we must consider the impact of digital media on our society and its immersion in our daily life. We must look at the present as an essential point of reference, a present that builds on a modernist and postmodernist perspective and proposes a hypermodernist viewpoint linked to the concept of the "here and now" (Lipovetsky, 2005). As suggested by Lipovetsky, societal values are changing to a different mode of being that he associates with *hypermodern times* and he states,

> Now that genetic technologies, liberal globalization and human rights are triumphing, the label 'postmodern' is starting to look old; it has exhausted its capacities to express the world now coming into being.
>
> ... It all happened very quickly: the owl of Minerva was announcing the birth of the postmodern just as the hyper-modernization of the world was already coming into being. (Lipovetsky, 2005, pp. 30-31)

Technology's ubiquitous influence on our daily life brings about digital media as a paradigmatic example of the influence of hypermodern times on the arts. Artists' creative process, sensory experience, and artwork production mode are nowadays influenced by digital mediums. But what factors influence the artwork?

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[1] Digital media encompasses various forms of electronic media where data is stored in digital form.
[2] Digital medium: defines software, hardware and various devices and technologies using digitized data to create digital art or computer assisted artforms.

Digital Media: Digital Medium

To elucidate how a digital medium impacts on the artist's creative process and artwork, this paper examines a research creation work from conceptualization to production mode. The work is studied from two perspectives: the artist's sensory knowledge and the artist's production mode, both influenced by an interaction with a 3D digital and technological environment.

The claim is proposed that hypermodernization, which emphasizes time as a main societal value, has an impact on artistic manifestation that engages with sensory knowledge. In *Hypermodern Times*, Lipovetsky describes how in today's society our cultural heritage reflects as a temporal referent; he claims that as a consequence of the unrestrained expansion of the ways we engage today with recollection, the *nostalgic society* paradoxically conveys a concept of the here and now. It is as though an excess of present and a proliferation of memory bring to conclusion the concept of modernization at a time when tradition has become fashion.[3] Lipovetsky states:

> The formidable expansion in the number of objects and signs that are deemed worthy to belong to the memory of our heritage, the proliferation of museums of every kind, the obsession with commemoration, the mass democratization of cultural tourism, the threat of degradation or paralysis hanging over heritage sites because of the overwhelming floods of tourists – this whole new insistence on everything old is accompanied by an unbridled expansion, a saturation, a boundless broadening of the frontiers of our heritage and our memory: and in these we can recognize a modernization taken to its logical conclusion. (Lipovetsky, 2005, p. 58)
>
> ... The value attributed to the past is a symptom of the advance of cultural capitalism and the commercialization of culture: as such, it is less a postmodern than a hypermodern phenomenon. (Lipovetsky, 2005, p. 59)

As Lipovetsky suggested, hypermodernity reflects an economic context which emphasizes the value we bring to tradition, as a need to safeguard our heritage. The concept of values attributed to the past conveyed by hypermodern times (Lipovetsky, 2005) is manifested in the research creation concept of *Vulnerable: The Salmon Project* as presented in this paper.

Research Creation, *Vulnerable: The Salmon Project*

The sculpture installation work, titled *Vulnerable: The Salmon Project* (see Figure 1), conveys an hypermodern worldview which refers directly to the film narrative projected on the cast aluminium standing salmon sculpture installation work (see Figure 2). The film subject proposing an historical family documentary on salmon fishing in the Gaspe Peninsula from the 1940s brings to the work, the concept of memory. The artist's family heritage becomes a metaphor for the declining condition of the salmon population, and the expression of the vulnerability of today's marine life. Through image mapping of a referential past on one side of the cast aluminium standing salmon sculpture form, whereby means of extruded letters on the other side, the viewer can read the text "Vulnerable"

Figure 1. Vulnerable: The Salmon Project. Cast aluminium sculpture

Figure 2. Vulnerable: The Salmon Project. Cast aluminium sculpture rear view with film projection

[3] Conference presented by Gilles Lipovetsky (2008). Deve-se culpar a Midia (vimeo). Part 3 Realizacao TV Cultura de Sao Paulo.

referencing a present condition, the artistic work encompasses an hypermodernist worldview exploring a sensory knowledge inspired by ecological to technological perspectives. The sculpture work itself posits opposing temporal forces: a technological approach manifested throughout the conceptualization and production mode of the salmon sculpture project, in opposition to the signified ecological discourse conveyed by the sculpture installation work as signifier.

The work stresses the opposing values of an hypermodern society reflecting a culture of the paradox in which Lipovetsky sees the need to acknowledge our heritage and he states, ". . . hypermodern society belongs to an age where everything is made into part of our heritage and duly commemorated" (Lipovetsky, 2005, p. 57). Furthermore, the French philosopher also indicates that through the celebration of the present or "the here and now" our society witnesses a technological growth focused on virtual means that affect human cognition.

In the sculpture installation project *Vulnerable: The Salmon Project*, the artist's experience of 3D technology is influenced by a digital knowledge that builds on a more traditional analogue production mode. From conventional transformative processes such as mould-making and metal casting, the research creation method expands towards computerized technology where the concept of transformation becomes linked to that of digitization. Digitizers such as 3D scanners or 3D modellers offer a broad and under-explored creative potential that propose new ways to appropriate, cast, duplicate, and transform objects in space.

Moreover, the sustainable attributes of a digital approach to artistic practice that avoids unnecessary material consumption proposes an openness to a more sustainable future—a future in which all sorts of goods and resources are accounted as valuable, where material waste is no longer conceivable and where preserving and recycling become a necessity. Finally, I would claim that the impact of the digital medium on artistic practice encourages the merging of concept and process through a medium ecology perspective that extends the relation of artistic and scientific domains.

Notions of Temporality and Spatiality

The notion of temporality is embedded in the study of digital medium, which in the context of this paper is linked to a digital spatial environment inside which the artist interacts with 3D computerized technology. The influence of a digital medium is emphasized through technologies such as: 3D modelling, 3D scanning and rapid prototyping (RP) or automated fabrication technology. A spatial dimension is explored where the notions of materiality, spatiality and temporality are linked to a computer environment and where the artist's creative process is subject to the influence of a digital spatial context.

The Fragmented Data Object

The structure of an object generated through computer technology conveys a concept of fragmentation (individual units or dots, bits of information) and diversification (concept of plurality conveyed by a digital medium). From a philosophical perspective, this characteristic may link to the social theory of individualism, or to a societal fact identified as belonging to an hypermodern society where science and technology challenge the humanity–space-time relationship. One might thus hypothesize that the *digital object* as a consequence of technological advancement mimics this sense of *self* carried by hypermodern times. From diverse perspectives—philosophical, social, artistic and technological—we witness the same phenomenon of division. Thus, in reference to the theory put forward by scientist Richard Dawkins in his book *The Selfish Gene* (Dawkins, 2006), man appears to simulate a certain organic behaviour or patterning common to all living natural environments. This behaviour is also common to technological environments where the concept of mutability is visible and also manifested through the change of societal values. The mutability of the digital medium brings about a digital object constructed through various modes of digitization.

Investigating Digitization

As a means to further investigate the phenomenon of digitization, it is possible to scrutinize the notion of the medium. How does the term "medium" become intangible, and immaterial, through digital means? As enunciated by French philosopher Jean Baudrillard,

> The medium itself is no longer identifiable as such, and the merging of the medium and the message (McLuhan) is the first great formula of this new age. There is no longer any medium in the literal sense: it is now intangible, diffuse and diffracted in the real, and it can no longer even be said that the latter is distorted by it. (Baudrillard, 1983, p. 54)

This inevitable change in the nature of the medium that the coded environment of the new digital media engenders allows multiple interpretations of the data source.

By means of the sculpture installation work addressed in this paper, digitizing processes have been utilised where the sculptural object is vectorized (see Figure 3) or represented as a series of points positioned in space and in relation to one another on an XYZ axis.

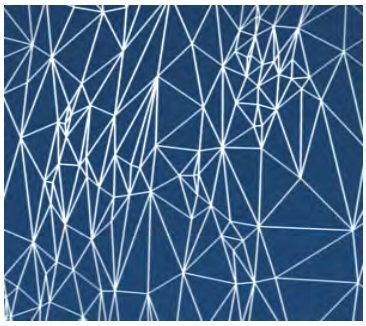

Figure 3. Polygon mesh. Close up view of vectorized Salmon sculpture 3D scan file

This computing representation of juxtaposed triangles recreates an object known as a data object (see Figure 4). The immaterial nature of the digital object conveys the notion of mutability or plurality of the digital medium. The data object can mutate into various forms of digital media, but it also conveys materiality. The mutability and volatility of the digital object contain the opposing values of the material and the immaterial. If we establish a parallel between the structure of a data object and that of a text, in a similar context to that of Derrida's deconstructionist theory[4] we can stipulate that the data object is dismantled in its original form[5] (Manovich, 2001). This extrapolation of the concept of *deconstruction* implies that medium specificity is now discarded through digitization.

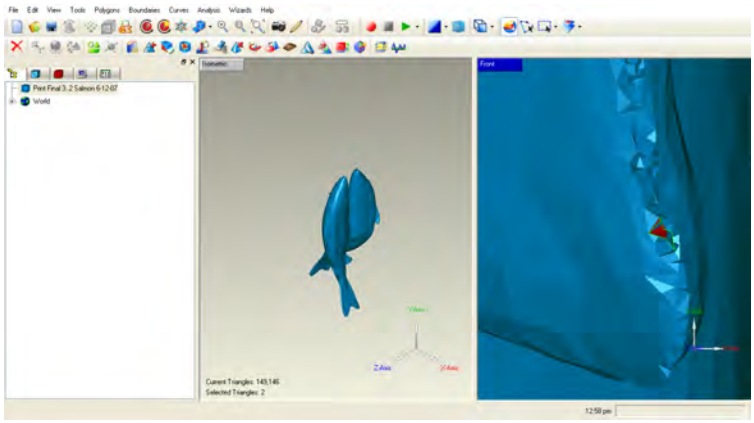

Figure 4. Computing representation of juxtaposed triangles recreates an object known as a data object

We are witnessing a creative era where computing and softwarization favour the merging of all forms of artistic expression. Digital technology leads to a potential symbiosis of creative mediums by which artists experience a re-defined notion of space, time, distance, and materiality. The notion of distance

[4] We refer to Jacques Derrida's concept of deconstruction, which is not about the dismantling of the structure of a text but a demonstration that a text is already dismantled in its original form.

[5] For strong points of view on different aspects related to the concept of digital language, see Manovich, L. (2001) *The Language of New Media.* Cambridge, Mass.: MIT Press.

translates into a time measurement, an expanded definition of distance that considers both time and space as linked to the travel of information or computer data (Logan, 2010).

Distance has become intangible and through computer automated production modes, the distance between the time the data object representation is sent to the machine and information is received, collapses. We experience a certain degree of symbiosis between the data object and the material object that it encompasses. Therefore, we can stipulate that 3D digital technology does impact on the artist's creative process through its redefined notion of space, time, distance and materiality. The change in the artist's relationship to temporal and objectified values influences the correlation between concept and production. Through conceptual and practical approaches to the creative process we experience a shift from traditional values carried by analogue processes where we understand that both the material and the immaterial inhabit the data object.

Immateriality versus Materiality

Today, artists experience, perceive and imagine from different standpoints, guided by digital and analogue approaches. However, the notion of immateriality is now rooted in a computerized medium in ways in which a digital sculpture 'holds' materiality.

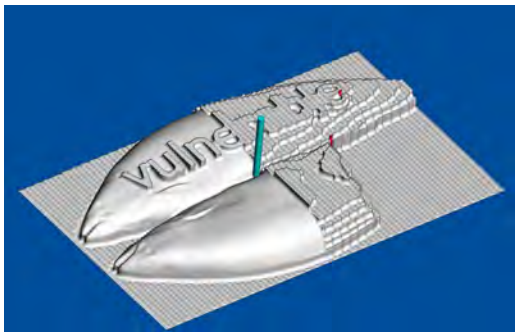

Figure 5. Simulation Computer Numerical Control (CNC) router pathway

Figure 6. CNC routing. Styrofoam Salmon sculpture form

When familiar with the technological environment and interacting with a data medium, artists' spontaneity becomes linked to the concept of the "here and now" conveyed by "hypermodern times" (Lipovetsky, 2005). The immediacy of function-action-reaction that artists experience while using 3D software tools or commands and the symbiosis between subject and object conveyed by computer automated fabrication (see Figure 5-6) are factors that encourage instantaneous pulse and artistic freedom. In addition, the gravity-free environment of data space does eliminate many of the constraints that artists experience while working with objects in space.

Creative Freedom

Creative freedom can be afforded in several ways. Firstly, we may look at how our societal values are influencing, through digital media growth, an era of the *self*, and the autonomous freedom that artists need to be able to experience creativity in totality through digital means.

Secondly, we look at creative freedom and share Lipovetsky's position about the difficulty of living associated with the level of inner freedom and intensity one wishes to live, that may be associated directly with the artistic temperament. As Lipovestsky proposes, technological advancement impacts on us and affects the individual's inner strength. He states:

> Thus it is that the ultra-modern period is seeing the growth of technological power over space-time, but a simultaneous decline in the individual's inner strength. The less collective norms can command our behaviour in detail, the more the individual shows a growing tendency to be weak and unstable. The more socially mobile the individual is, the more we

> witness signs of exhaustion and subjective 'breakdowns'; the more freely and intensely people wish to live, the more we hear them saying how difficult life can be. (Lipovetsky, 2005, p. 56)

Thirdly, on the one hand, we stipulate that creative freedom plays an important role in artists' creative thinking and mode of production. On the other hand it is acknowledged that collaborative work between artists and scientists is important, including technical assistance, where an increase in collective norms can greatly benefit artistic experience within a digital and technological platform.

Based on these premises I would argue that often artists are affected by their limited capability to work independently with 3D digital and technological tooling. The level of freedom experienced while using 3D scanning or/and creating digitized forms inside a 3D digital and technological environment is dependent on one's comprehension of the data object structure and ease in playing with its mutability within the 3D software interface environment without experiencing technological constraints. Therefore we can claim that artists' creative freedom is subject to an adaptation to the pace at which technological growth develops and how they adjust to it. Artists need to adapt to new ways of experiencing 3D in an hypermodern epoch where space-time and materiality are greatly affected by the growth of digital media and interrelated manifestations of technological advancements.

Through research creation work I experience that while exposed to a 3D software environment, artists are subject to a digital spatial context that triggers their interaction with objects in space. Also observed were artists' sensory experience through data object creation, manipulation and transformation informed by a capacity to apply, understand and play with the software interface or tools, informed by a level of autonomy within the digital environment. Software knowledge influences artist's sensory experience in ways that follow the pattern of an exponential growth. I noticed through case study observation that the artists' level of autonomy is often limited to basic functions and subject to a *required* technical assistance. I claim that technicians' assistance can be perceived as an additional interface between the artist and the digital medium. This second interface layer affects artists' cognition and is an obstruction to the correlation between a conceptual and practical approach to the creative process. However it is acknowledged that constraints and obstructions may also act as creative stimuli that trigger the *unexpected* experienced through creative activity.

Paradox in Sculpture Practice

In the domain of research creation the concept of technological constraint again is paradoxical since it stimulates and encourages greater interaction between artist and scientist. As the relationship between science and art expands, it implies that artists and scientists collaborate more often to share knowledge necessary to the creative exploration of both a scientific and artistic domain growth.

Artistic Autonomy and Collaboration

A paradox is imbedded in opposing forces challenging the concept of collaboration, where the artist's creative process historically has been identified as a self-reflecting experience. How do we cope with this dichotomy opposing the artist's cognitive experience (the self) and the necessity of a collaborative work inherent to the gain of a necessary level of freedom from both perspectives—science and art?

While collaboration between artists and scientists increases, as well as mediums' intangibility and interaction with the expansion of digital media, the tangibility of the work of art, more specifically in the sculpture domain, is henceforth embedded in the digital object. The ubiquitous acceleration and expediency that digital media and, moreover, digital media production[6] provoke, is effecting a form of *effacement of traditions* (Lipovetsky, 2005). This concept of effacement of tradition is experienced in the arts, where the relevance of more traditional skills and more traditional approaches to medium are

[6] Digital media production addresses "the process in which digital files are created, enhanced, encoded and distributed using different methods of processing via computer hardware and software applications". (WiseGeek) http://www.wisegeek.com/what-is-digital-media-production.htm

being questioned. However, according to Lipovetsky nothing is really lost; it is different, "The fact is that we have lost neither past nor future—the relationships to these dimensions have assumed a new and different importance in tandem with the way the present is extending its empire (Lipovetsky, 2005, p. 41). Lipovetsky addresses the concept of presentism that rules our life today as if: "It never ceases to open out on to something other than itself (Lipovetsky, 2005, p. 41).

In sculpture practice, while the digitized object regains physicality through rapid prototyping technology, transformative analogue processes such as mould-making and metal casting (see Figure 7) are used to bring permanence to the sculptural object (see Figure 8).

Figure 7. Aluminium pour of the salmon project

Figure 8. Patination of cast aluminium sculpture

We can claim to "have lost neither past nor future" (Lipovetsky, 2005) but the concept of transformation today is perceived from a different perspective; it is where bits become atoms or, as stated by Negroponte "The change from atoms to bits is irrevocable and unstoppable" (Negroponte, 1995, p. 4) and vice versa.

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14. VIRTUALITY AND NATURE'S DIGITAL SPECTRE

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Abstract

The author's studio practice is concerned with strategies to facilitate innovative modes of seeing to increase awareness of human impact on nature. The conceptual ideas for the work evolved through exploration into how we see images through photographic and cinematic frameworks that represents our world in general. The paper considers how this shapes our vision of the world—importantly how we use aesthetics in 'new' media—and how technological advancements present the simulated image in the virtual environment. The creative work uses photography as the medium: firstly, to explore the effectiveness of the cyber-hologram, and to simulate a virtual experience relating to human transformation of nature-scapes and nature's resilience to technology. Secondly, it explores the distinction between artificial modes of viewing nature and seeing the natural world. Finally, the author's images act as metaphors to illustrate the changes in our perceptions of nature by positioning the everyday flower into the future echoing a past ecology as a distant memory, reflecting back via a virtual mirror image, a post eco-apocalyptic view of global warming and changed natural systems. The images presented demonstrate the importance to what Jung (1964) suggests is for the 'ecologization of technology', relating to the need for balance with nature and our industrialised world. Virtual space is increasingly changing the way we view images, creating a fundamental ontological shift in our visual constructions of what we call reality. Virtual spaces have the ability to transport the viewer/user into a totally self-contained 'other' world that requires no reference to actuality.

Keywords: Virtual reality, three-dimensional simulated environment, photography, nature, environment, industrialisation

Introduction

The author's motivation for this paper was instigated by the notion that we no longer recognise the ancient spirit of nature to which previous cultures adhered, because we live in a post-modern world where electronic technologies at all industry levels are continually evolving at a substantial pace. The paper discusses our electronic age that has brought with it an electronic way of seeing, particularly of simulated and virtual environments, through the photograph via the cinema, television and on computers; these media are today's progeny of photography's pioneers. Discussion includes the social, cultural, philosophical and ethical issues regarding the exponential rise in technology's effects on perception and traditional modes of seeing, and the way we see nature. Our culture tends to imbrue an ambivalent attitude toward the environment, a dualism that expresses either romantic notions of the wilderness or the need to conquer nature where " … modernity is partly defined by the enormous conceptual barrier erected between nature and culture" (Davis, 1998, p. 11).

Much of what we think of as natural is a product of our culture "both in a physical sense and in the sense that perceptions of its beauties and value are culturally shaped" (Soper, 1996, p. 26). The media delivers a false but believable idealism about nature as consumer objects complete with the desirable illusion of being natural through re-representing and repackaging (Elliot, 1997, p. 123). We are sheltered in houses that are warm in winter and cool in summer, and many in western societies have become detached from the natural rhythms of seasons (Adams, 2003, p. 110). We no longer see, understand or relate to nature as we previously did; rather we relate to nature at a mediated distance, in short bursts or by remote control and in cyberspace. We consume simulated images via screens in a digital and fluid world in our houses, while driving, at work and for entertainment. Adams (2003) proposes that much of our knowledge about conservation is largely built on images that describe the city's capacity to destroy (p. 111). Asking people to envisage a future city will often result in images

of a barren space. Many people participate in imagining the destruction of nature by not considering a green environment in their perception of a future city. It is rare to find people who do imagine plants and animals amid the architecture of the future. Thus, the author argues that it is as critical to imagine nature in urban life as it is in the countryside, and it is also important to cultivate in people a positive philosophy for nature in order to foster awareness about nature in our communities now and for the future.

In Context

Our ancestors' endeavours to fix an image in order to mirror nature have profoundly influenced our own theorising about how we see images of nature today. Ocular innovations from the early modern era have contributed to our contemporary terms of reference for our ways of seeing nature. The evolution of the technical capabilities of ocular instruments has been paramount in the search for means to present a realistic picture of our world. The still photograph and the moving image as scientific instruments in the western world have been accepted to make such a picture. They have been among the largest social contributors to our knowledge about nature, our past and how we as a society live (Adams, 2003). Photography occupies a privileged position in our public discourse on nature, due to the seamless blending of the medium's optical truth and its expressive potential for artists, assuring its place for communicating values about human relations with and in the natural world (Bright, 1992, p. 60). Without the photograph, we would need to rely on the representations available via traditional handcrafts and dramatisation or dance for visual information about our society and environment. These are often highly short-term representations; the scientific discovery that enabled the chemical fixing of the photographic image has allowed us to keep an unaltered pictorial record of our place and existence.

Since its discovery, photography has dramatically evolved into a momentum of digitised fleeting images, its speed and its pursuit of sanitised simulated perfection – of image and sound. We increasingly experience images of nature in serial mode, quickly printed and uploaded to such spaces as the World Wide Web: '…the world of digital automata is an electronic world alien to the world of real nature' (Jüng, von Franz, Henderson, Jaffe & Jacobi 1968, p. 91). Our world driven by information technology opens up "Two world trends [that] are powerfully reshaping human existence; the degradation, if not destruction, of large parts of the natural world, and unprecedented technological development", is shaping and changing our experiences with nature (Kahn, Severson & Ruckert, 2009, p. 37). Technologies that augment or simulate the natural world continually provide us with virtual environments of mediated digital familiarity. We continually experience, as the 'norm', technological nature —copies of the original and manipulated representations of reality.

> The substance of an image, the matter of its identity, is no longer to do with paper or particles of silver or pictorial appearance or place of origin; it instead comprises a pliable sequence of digital codes and electrical impulses. It is their configuration that will decide an image's look and significance, even the possibility of its continued existence. (Batchen 1998, p. 22)

This development of the simulated representation of virtual nature has led concerned green theorists Levi and Kocher (1999) to debate issues about how we represent, and indeed value nature in virtual environments. By comparing the natural with the simulated, they argue that artificial worlds have the potential to devalue nature and therefore make us fail to realise how our physical and continual degradation of the landscape impacts real nature (1999, p. 206). Visual automata foreground the impact this media has on society in its distanced attitude towards the natural environment. Due to the rapid escalation of visual autonomy, we no longer see images as material objects. Instead, we see them simply as 'signs', to the extent that the creation of photographic art still brings with it a certain insistence upon the material form, despite its increasing ethereality of format. This has the propensity to change the foundations of original theoretical interpretations about our visual world, from a previous analogue perception, to a new digitally simulated perception. In the twenty-first century, Ascot (2003) notes, "… we shall need to create new metaphors to house the complex interacting

systems of biological, technological, and social life that we are developing" (p. 327).

Technology also plays a central role by exploring the perception of space within such mediated realms as virtual environments, such as virtual reality. "Virtual reality can be defined as a three-dimensional generated simulation in which one can navigate around, interact with, and be immersed in another environment" (Briggs, 1996, p. 13). Virtual space is the spatial reference system for the production of complex mental processes, but new media differs from the space of traditional painting or drawing or of our physical reality. "The raw input of visual processing is markedly different from our conscious percepts of the world" (Noles, Scholl & Mitroff, 2005, p. 324). Thus, virtual space becomes an extension of consciousness (Ascot, 2003). For example, when seeing a large rock we instinctively know that it should be a heavy object, but to view it floating in a virtual environment contradicts our physical reality. We can action a new thought for the rock's meaning that will change our existing knowledge of the rock in a physical world, although:

> Our experience of the visual world, in addition to being structured, is inherently structured: We do not perceive a series of unconnected snapshots of the world, but rather a richly connected sequence of visual events involving persisting objects that retain their individual identities across time and motion (Noles et al., 2005, p. 324).

Being immersed or viewing virtuality creates a shift in our ideology about our known world. According to Lister (1995) in this world space becomes no longer knowable (p. 4). Furthermore, Morse (1996) advocates that:

> The very notion of an environment or landscape, either virtual or real, becomes more and more difficult to distinguish from the symbolic field itself. We are immersed in symbols that have been lent not only agency, but an agenda based on assumptions and viewpoints that are as relatively autonomous as the technology allows (p. 227).

The impending change to new modes of seeing via electronic simulation systems will bring with it many questions about how we use this technology (Lister, 1995, p. 4). Rheingold (1992) explains that our advancement towards virtual reality:

> …demonstrates our social contract with our own tools that has brought us to a point where we have to decide fairly soon what it is we as humans ought to become, because we are on the brink of having the power of creating any experience we desire (p. 386).

The fundamental nature of the real world is called into question in the virtual realm. Visual technologies presented in the virtual world are able to show that there has been a radical shift in our perceived relationships with reality, and that the emphasis has moved from physical appearance to ethereal apparition. This challenges our perceived reality: The cultural status of objects cannot be fixed or defined (Ascot, 2003, p. 280). French theorist Paul Virilio (1994) implied that we are on the verge of a wholly synthetic vision (p. 59). In this synthetic vision, we continue to move towards a more integrated automation of perception by giving objective reality to electronic machines that has no permanency beyond that of a mental or an instrumental vision of memory or dreams, a synthetic perception.

Virtual reality is making way for the creation of a new 'industrialisation of vision' that will raise ethical, cultural and philosophical questions (Virilio, 1994, p. 59). By rationalising this new synthetic perception, these artificial modes will be perceived as the new reality. This will affect how we see plants and animals—and indeed the entire visually-perceived world. According to Levi and Kocher (1999) the issue that arises is not whether virtual nature produced by these technologies could satisfy human desires to experience nature, rather it is whether by using or viewing "virtual nature to satisfy our psychological desires we would become less aware of what we as humans are doing to our environment" (p. 224). McLuhan (1968) discussed living in a world that has put satellites around the planet and where nature is no longer experienced as the external world, but becomes the content of an artwork with nature as it is currently experienced ceasing to exist. McLuhan suggests that when we

establish a manmade environment around the planet in a sense nature is abolished. Thus, nature would need to be programmed and the environment would not be visible, rather it would be electronic information (McLuhan & Mailer, 1968: CBC).

The Studio Work

In order to understand how the artist makes representations to others of the world we live in, it was essential for the author to explore the means by which we ourselves view the world. It is important to note here, that whilst working on computers to deliver messages about technology's impact on nature, an unfortunate by-product of today's fast moving digital age is the obsolescent equipment that often ends up illegally in dumping sites around the globe, particularly in the developing world. Much of this e-waste contains a large variety of toxic materials that are extremely hazardous to the living environment (Takatsuki, 2006).

Pioneers such as, Henri Fox Talbot, Louis Daguerre (in particular his light spectaculars) and more recently the holographic work of Paula Dawson motivated and inspired the author's visual aesthetics, including experimenting with various forms of light, to produce a unique and an original way of viewing photographs of nature. The light experiments were captured using a high-end digital camera and then manipulated via software to produce a variety of optical illusions. The result was a series of images born of a three-dimensional technique that mimic holography. The notion that the medium of holography is the next technological mode for viewing images in our culture was influential in establishing the concepts for the creative work concerning our industrial impact on nature and surroundings in general (refer to Figure 1).

Figure 1 Holographic Chroma-depth 3D image: An artificial glass flower hovers over industrial cranes—photographic digital image and projection.

The framework for this project evaluates the distinction between artificial modes of viewing nature practiced in the visual arts and the mythological notion of a pure, wild, untouched or untamed nature. The author's images are made up of a metaphorical collection of juxtapositions and contrasting signs

that seek to trigger emotional, intellectual and imaginative responses in the audience. This is demonstrated by presenting via digital photo-media the simulated image of nature in a three-dimensional virtual space, thereby enhancing the content and experience for the viewer. This also demonstrates that the virtual space conveys the notion that people may eventually lose the ability to distinguish between the simulated image and the natural depiction of nature. To express this, the works emphasise a post eco-apocalyptic view, foreshadowing a past ecology that could one day become only a distant memory. The materialisation in the work for this idea is a reference to global warming warnings predicated since the industrial revolution. These warnings are continually highlighted in the media concerning the melting of glaciers, rising waters, climate change, the devastation of forests, and the destruction of species and of natural habitats. Although, it is important to understand global warming may not be entirely due to homocentric actions, but also result from natural phenomenon such as changes in the sun's solar activity. However, it is essential for us to realise that we are contributing, on a large scale, to global warming; consequently hastening climate change. We cannot continue to sustain the current consumption and industrial development that we have accepted thus far.

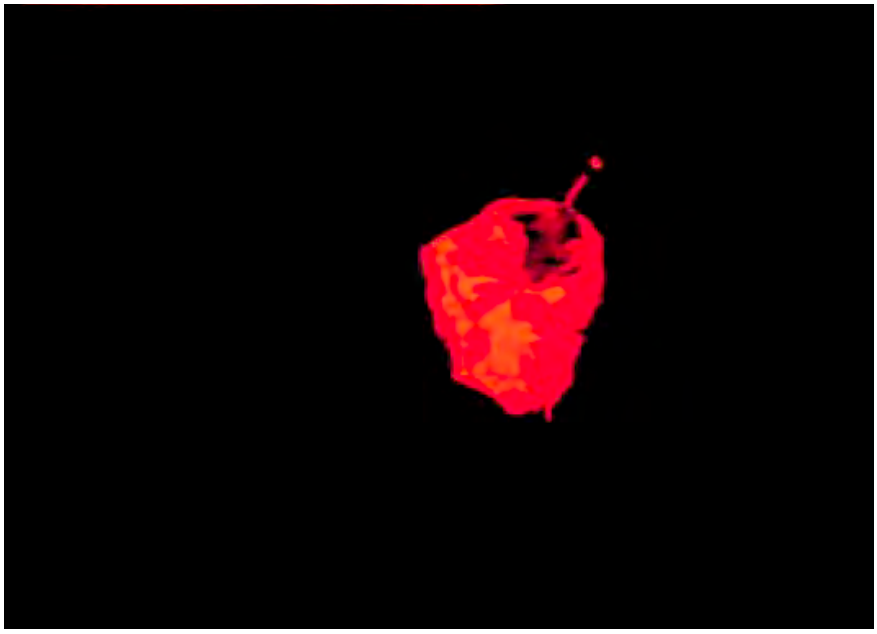

Figure 2 Holographic Chroma-depth 3D video projection: The leaf spirals in a continuum, seemingly out of control and the appearance or the sense that it is hot is reference to our perpetual industrialisation and its continual impact on nature.

The author's project imagines nature as future virtual content included in haptic systems that will encompass all human senses through vision, hearing, touch, taste and smell. By being totally immersed in a 3D simulated environment, there is a fear that the viewer may not realise how continual degradation of the actual physical landscape impacts on our cultural image of what is indeed natural about nature. Further, the intention of the artist is to illustrate the manipulation of time and space using this virtual technique, demonstrating particularly how these digital modes are evident in the work. The technique delivers an experience for the audience by imbuing the images with an enhanced feeling of "you are here now, in this space, and at this time". But unlike a movie camera that can pan and record the atmosphere of a scene, the photograph falls short of expressing the totality of the whole view and experience. When viewing a still image, particularly images about nature, the audience understands that a sensory deprivation from the real occurs. My response to this challenge was to seek to imbue the image with the essence of my subjective experience to give the audience a sense of being there with me in this moment, in this place (Livingston, 2006).

The three-dimensional effect applied in the images creates the illusion of depth; it is intended that the audience sense they could almost step into another world because the floating objects enhance the feeling of 'witnessing the moment'. The intention of the artist is to demonstrate how these digital modes of representation change our perception of nature, and so our sense of being in the world. The author considered that the delicate simulation and nuances would successfully retain the photographic quality of the image, rather than choosing to create self-evidently digitally enhanced images. It was important to instill a sense of realism into the work; the associations of the photograph with 'reality' and the use of the three-dimensional technique enhance this strategy.

The author recognises the concerns Popper (1993) raises about how psychological and social implications contribute to a new dialogue with new media devices (p. 126). Media such as virtual reality have the ability to transform our attitudes towards time and space, because time and space are malleable. The project opens up what Popper (1993) describes as:

> A common aesthetic factor in technological art regarding the visual and the multi-sensorial … the new way human perception can be stimulated by creating the conditions in which the metamorphosis of form and colour, the immateriality of objects, the paradox of image and reality in illusionism and, above all, the unseen aspects of our universe can become perceptible (p. 180).

New techno-practitioners are the computational creators for new modes of seeing, and ways of viewing for a possible future aesthetic. As Brennan and Jay (1996) write, "… whole theories have been built on distinctions between 'the gaze' and other types of seeing, such as 'the glance', or on distinctions between 'panoptic', 'virtual' and 'mobilized gazes' [a]s culturally specific" (p. 3). Attention is being paid to the new scientifically and technologically generated 'techniques of observation' that are also dependent on culturally inflected visual practices, that also question those theories generated from their original field of inquiry (Brennan & Jay, 1996, p. 3). The author's photo-media images aim to communicate this future aspect by using digital technology to provide a subjective view about how we pursue industrial development in the face of a decaying or at least a rapidly changing natural environment.

The theme of flowers used throughout the images is popular subject matter for artists; for centuries flowers (particularly early European flowers shown in paintings and craftwork) held an iconographic status of meaning for important events. In medieval paintings, flowers were predominantly used as indicators for interpreting pictures, such as, symbols pertaining to hidden religious meanings. In the past flowers were popular subjects partly because they satisfy our sense of beauty and partly because they had an extremely important role in folk medicine being common medicinal herbs grown in the gardens of monasteries and convents for their pharmacopeia qualities (Schnieder, 2003, p. 135). Flowers are used for "spiritual and physical wholeness"—for example salvation through Christ and medical healing—"as one indissoluble unit" (Schnieder, 2003, p. 135). The colours applied in the creation of the author's *'Bells with Roses'* (Figure 3) reference the religious paintings of the past.

Figure 3 Holographic Chroma-depth 3D image: 'Bells with Roses', from the Digital Spectre series. Purchased by Moreton Bay Regional Council, for their New Media Collection.

Although here, nature is presented as an enhanced energetic artificial bell shaped flower, and the background symbolises the fading of actual nature represented by the dying rose buds, the main subject of flowers was intended as a metaphor representing the fragility of actual nature. Using artificial flowers transforms the original meaning of the object into what Barthes (1964) argues is a myth by deliberately using something else to lead us to connect these as a signifier of nature (cited in Howells, 2003, pp. 101-102). Many of the objects are synthetic and are metaphorical devices signified to mimic nature. This is to describe how myths both ancient and modern, encode the hopes, dreams, needs and fears that are related to cultural values. For example, the main photographic element in Figure 3 is actually an electric lightshade but in this context, it is a symbolic representation of a bell shaped flower; a form seen in nature. The light shade is the signifier (artificial flower) resembling or imitating the signified (the realistic flower) where the signifier and the signified are united in what Barthes (1964) describes as the basic semiotic concept, thus, "… things do not mean anything by themselves, but are invested with meaning by cultures and societies" (cited in Howells, 2003, p. 100).

Enhancing the objects in the works evokes certain sensations in the viewer. This was intentional. Furthermore, the inclusion of many elements of actual nature in the work suggested another world, a believable reality that could exist in an unknown space. This other space verges on the fantastical, being a synthesis of both fiction and reality intended to transform our perceived view of the world around us. This strategically embraces artifice and simulation whereby the artist conceptually anticipates the digital message that photographs are not impartial, but contain aspects of various realities depending on the viewer's perspective of the artist's intent. "The artist takes advantage of this expanded reality to express what makes up the truth of our world, and the signs that once were meant to refer to reality now point to individualized versions of that reality" (Hirsch, 2000, p. 471).

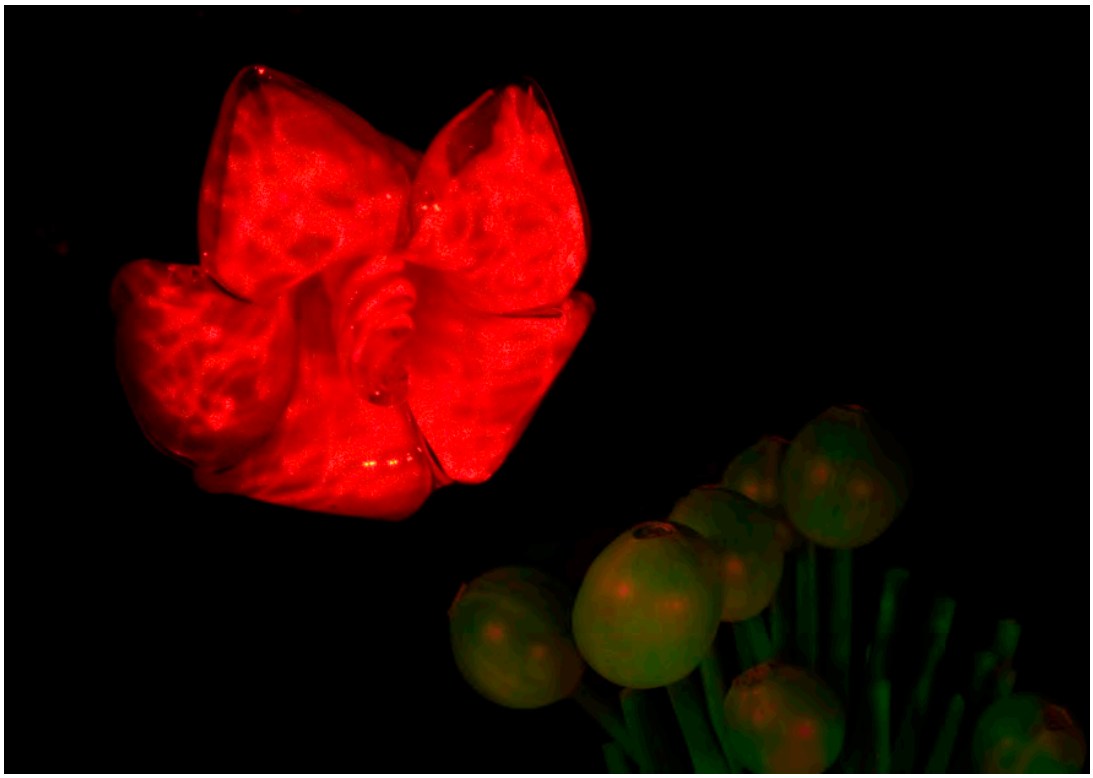

Figure 4 Holographic Chroma-depth 3D image: 'Red Artificial Flower', from the Digital Spectre series. The flower acts as a metaphor for the moon rising over a scene of real seedpods.

Exploited in the work is the colour red (Figure 4), the dominant colour of the spectrum. A primary colour on the colour wheel, it is the first colour of the rainbow. Red has the longest wavelength discernible by the human eye. Red is accessed across all of the images for this creative project because it symbolises danger for many cultures as well as being warm and energetic. In human psychology, red is perceived to stir the emotions such as anger, passion and love, and it is the colour of blood (Meola, 2005, p. 41). The colour red signifies the universal visual signifier of life and death, stimulating in the audience an immediacy to react.

Because the underlying theme for these images is a futuristic scenario, and its intention is to induce an apocalyptic view of nature, red signifies a warning regarding global warming and over industrialisation. Another dominant colour featured throughout the work is green, and this of course signifies nature and the natural environment. To signal this message the work also defines a further relationship, that of absence and presence; absence—without detail by using a limited colour palette, and presence—the enhancement of colour and detail.

Describing the simultaneous paradox contained in the photographs, absence and presence is a duality creating a desire to graft physicality back onto the image; for example controlling the exposure when taking a photograph can either highlight or subdue detail. Absence and presence of light are important traditional methods to describe positive and negative aspects, where light through the lens records a presence. As much as it records the presence of light, a photograph also records light's absence such as shadow. Although the images appear attractive to the audience, the artist's intent is for the viewer to also recognise the colour red as urgent in terms of the environment. The random and hectic movements formed by the laser light enhance this connotation of urgency (Figure 5).

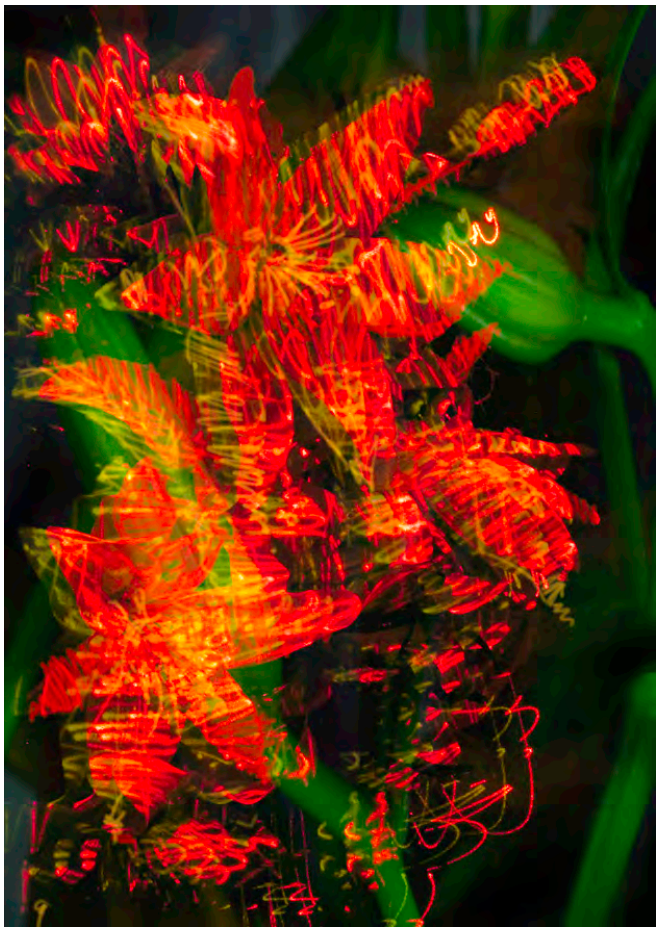

Figure 5 Holographic Chroma-depth 3D image: 'Buds and Flowers', imbued with frantic laser light beams, from the Digital Spectre series.

The author's work encounters this information by forming digital patterns of recall appearing through the exploration of virtual hyper-real, three-dimensional, visual sensory recognition. The concept uses the present to observe and expose the effects of our industrialisation and delivers these as metaphors for how we change nature through our increased use of technology. Manipulating photography in the digital and virtual realm enhances the message, but at the same time it dematerialises the naturalistic aspects of representation by redefining the relationship between the viewer, nature, and its re-representation.

Conclusion

Although the works here suggests a form of hyper-photorealism using a three-dimensional method, the visual qualities of the resulting images radically differ from those of photography; the manipulation of the pixel leads to an almost supernatural level of detail giving an elevated hyper-real physical presence of nature. As previously stated, the work imbrues the concept of enhanced nature suggesting or manifesting another world, a believable reality that exists in an unknown place, verging on the fantastical that synthesises fiction and reality, or culture and nature, and the ways they inform our view of the world around us. "We leave nature through our culture and technology and re-enter it as an alien species" (Elliot, 1997. p.123). Elliot further considers that much of nature is an alien species because of the introduction of foreign plants and animals into eco-systems that were at some time previously stable. Our technology has invented our landscape as a roadside view in which it is "… an event in automotive space"; the designers of scenic tourist routes instruct their users in the beauties of nature by removing whatever bits are deemed unsightly (Soper, 1996, p. 26). Corporate developers use new media technologies to design the mediated nature-scapes that intertwine with our built environments. The simulated, virtual and artificial worlds of nature are becoming more commonplace and our lives

continue to acclimatise to corporate nature shaped by commercial advertising, such as through the simulated photographic image. Yet, nature-scapes simulated in three-dimensional environments through virtual reality machines and other stereo-immersion technology, have the potential to be beneficial to society, particularly for endangered species. People are able to view protected sites or wildlife that may already be extinct through this media. Images of what has been lost may change peoples' inherent ideologies towards valuing still extant protected natural habitats as well as rare and endangered species, and encourage people to foster nature within built environments.

In the past, Talbot famously and enthusiastically used themes of cognition and the science of optics to entertain his audiences with spectacular three-dimensional images; the three-dimensional illusion has stood the test of time by being rejuvenated by electronics in the present era. We are working to understand the significance of the rapid rise in vision technology with the emergence of hypermedia, hyper-reality, virtual worlds, cyberspace, and a post-biological age "that renders it impossible to discuss issues on the cultures that it enters" (cited in Lister, 1995, p. 2). Although virtual reality and holographic mediums are still developing the analogies drawn from Plato's CAVE Passage[1], nineteenth century dioramas are indicators for the future of vision. Although most of humanity's visual experience is through natural faculties, the introduction of optical media has reorganised perception. The two-dimensional photograph displays objects frozen in time, whilst the hologram displays objects frozen in volume. Since the invention of the hologram and 3D vision, virtual mediums have been escalating en masse into the worlds of entertainment, advertising and the World Wide Web. We will need to readjust our understanding of how these will affect our vision of nature.

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15. DESIGNING URBAN SOUNDSCAPES FOR THE EFFECTS OF NATURE

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Abstract

Acoustic ecology prioritises the protection of natural soundscapes from urban and technological noise; however, the incessant global spread of human-induced noises calls for renewed creative responses to urban soundscape design. This paper suggests a deep listening practice within undisturbed natural soundscapes to reveal the 'effects of nature', the knowledge of which may be transposed upon the noises of urban soundscapes; a methodology emerging from this practice is the 'repatterning' of existent sound objects in urban spaces. The suggested practice requires a bifurcation of acoustic ecology's traditional approach: firstly, continued active preservation of existing natural soundscapes; and secondly, transforming the noises of urban soundscapes by referencing the 'effects of nature'. Applying the ideas of Serres and Guattari to acoustic ecology practitioners, such as Schafer and Truax, is integral to this emergent approach. Serres suggests noise has a stercoral effect on space, while simultaneously acting as a transformative tool for the reordering of social relations; Guattari's ecosophy by eschewing the nature-culture dichotomy interrelates the protection of environmental ecologies with the diversification of mental ecologies and social ecologies. Such transversal analyses of differing modes of thought offers recontextualisations of acoustic ecology approaches, which is demonstrated by two case studies described in this paper.

Keywords: Soundscape design, sound installation, acoustic ecology, urban soundscapes

Considering urban noise

Schafer on noise

The World Soundscape Project (WSP) brought the world's attention to the fate of natural soundscapes. Under the leadership of R. Murray Schafer numerous studies were completed (Torigoe, 1982) which demonstrated that natural soundscapes were disappearing due to the increasing din of the industrial and then electrical revolutions (Schafer, 1977, p.71). Throughout his career Schafer has been particularly (though not exclusively) concerned with the increasing global reach of noise, and discusses its associations with a transforming society. For example the text *The Tuning of the World* contains numerous religious references to noise as the harbinger of the end of time, and the "cosmic sounds" of the Gods as the initiator of time, thus referring, mythologically, to the transformative power of noises – destructive and constructive (Schafer, 1977, p.25-8). In his book *Temples of Silence, Voices of Tyranny* Schafer unambiguously expounds his detestation for noises emanating from motorised objects, and evokes the portrait of a man tormented by the contemporary urban soundscape (Schafer, 1993, p.63-7). Concerns with the degradation of soundscapes by noise continue to inform the activism of the World Forum for Acoustic Ecology (WFAE).

Truax on noise

Barry Truax fortified acoustic ecology's academic foundations with his book *Acoustic Communication.* The first half of the book discusses the relationship between listener and soundscape at length. It concentrates on the alienating effects of homogenous contemporary urban soundscapes on the listener, and the deleterious effects on humanity's sensory apparatuses by the deluge of city noises. Truax (2001, p.23) writes:

> … the lo-fi environment seems to encourage feelings of being cut off or separated from the environment (where) feelings of alienation and isolation can be the result.

Lo-fi refers to a "poor signal-to-noise ratio" (Truax, 1999, para. 1), a term also utilised by Schafer, which suggests the degradation of urban soundscapes by noise. The second half of Truax's book is devoted to electroacoustic composition, with the last two chapters pointing towards its capacity for the electroacoustic design of urban soundscapes. As shall be discussed, urban soundscape design has been an enduring and perhaps under represented legacy of the activists who formed the original WSP and today's WFAE, both of which have been, I believe, unfairly typecast as hostile towards technology and urban life (for example see Hellstrom, 2003, p.20).

Serres on noise

Schafer and Truax have an unlikely ally in the form of Michel Serres. The thinkers come from different intellectual traditions - the former informed by romantic and compositional concerns and the later by post-humanist explorations of social relations; particularly regarding the book, *Parasite*, part of which explores noise as a transformative agent where the existence of static in a signal enables the re-ordering of existing social relations. In regard to contemporary soundscapes (urban and rural) Serres (1980, p.94) is unrelenting in his detestation of noise in the soundscape:

> … noise coming from motors filled space everywhere. There was no space without a motor. Even in the most rural country spots, the chain saw, acute like a dentist's drill, replaced the grasshoppers. Thus the motor, an expansive phenomenon, filled space… Noise is stercoral: it makes the occupation of an expanse intolerable and thus gets if for itself.

Serres considers noise in the soundscape an integral expression of power (technological, social organisation) that dominates the sensorium – a view he apparently shares with Schafer who, as discussed, describes noises with similar detestation in *Temples of Silence, Voices of Tyranny*, and with Truax, who describes the alienating effects of urban noises upon the listener.

Noise as transformation

Serres' descriptions of noise which, as mentioned, forms part of a larger discussion regarding the role of the parasite in social relations and poses an interesting question – is the contemporary urban soundscape, which is dominated by an ever-diminishing signal to noise ratio, a harbinger of transformation, a new order, where "noise, through its presence and absence, the intermittence of the signal, produces the new system" (Serres, 1980, p.52)? Or alternatively stated, could the noises of the urban din be considered agents of a longer-term transformation of social relations? The question is suggestive of creative approaches to acoustic ecology and soundscape design, where alternative relationships with the noise of the urban soundscape can be imagined. Bjorn Hellstrom (2003, p.11), who uses a structuralist approach to soundscape design as developed by the Centre for Research on Sonic Space and Urban Environment (CRESSON) applies what he calls 'noise design', claiming "noise now has qualities that may contribute positively to urban space". Acoustic ecology with its Schaferian roots in mythology and preference towards natural soundscapes contains its own potential to construct a differing approach towards urban soundscapes, by re-perceiving urban noise as a transformative agent with which the soundscape designer can creatively interact.

Considering natural sounds

As has been suggested acoustic ecology has been largely concerned with understanding the sounds of nature and protecting undisturbed soundscapes from the encroachment of urban noises. Two acoustic ecology practitioners in particular demonstrate this trend: Bernie Krause and Gordon Hempton.

Niche hypothesis

Bernie Krause introduced the term, 'niche hypothesis', which describes the capacity of natural soundscapes to localise the vocalisations of species into particular frequency ranges, enabling each species to inhabit its own niche in the soundscape (Krause, 1987); it is the aural equivalent of an animal claiming a physical territory in space. The 'niche hypothesis' is suggestive of design in nature (no referent to designer intended here!), which allows for the emergence of a multiplicity of types.

Krause completed extensive studies on the effect of urban noise sources, especially airplanes, on natural phenomena such as synchronous chorusing, demonstrating how nature's soundscapes are abruptly affected by interruptions of noise (Krause, 1999, p.1-4). Krause seems exclusively interested in the sounds of the wilderness, most recently expressed by his part in the formation of the new scientific discipline 'soundscape ecology' (Pijanowski et al., 2011); however, as has been suggested, Krause's niche hypothesis could assist in the design of urban sound objects such as alarms and sirens, to inhabit specific niches in the urban soundscape (Ballas, 2000, p.1-4). The theory is certainly suggestive of a conceptual tool for soundscape artists to consider the design of urban soundscapes, something I discuss in a recent article (Lacey, 2011, p.24-7).

One square inch of silence

Gordon Hempton is known for his tireless activism in the creation of *One Square Inch of Silence* (see One Square Inch, 2013). It is a most remarkable feat not only in that he was able to achieve it, but also that he has demonstrated to the world that silence (read silence as the absence of human induced sounds) is disappearing due to the global encroachment of noise. Hempton's work expresses the ideological activism of Acoustic Ecology par excellence, not only in his success, but in his desire to purge noise from spaces deemed to be sanctuaries of naturalness, where naturalness refers to an absence of human induced sounds. While important, Hempton's approach is also problematic. His work encourages a dichotomy between nature and human culture in which the image of a war between human sounds and natural sounds emerges, which risks ignoring the complex interrelationships of human culture and nature. Furthermore, the notion of silence, which John Cage so famously suggested is unattainable, is also problematic. LaBelle (2010, p.64) in his recent book *Acoustic Territories* describes silence, particularly in suburbia, as a form of noise control that translates as social control; silence, in this sense, is not a natural phenomenon but representative of controls upon human relations. Indeed, anyone who has experienced a natural soundscape and a city soundscape would surely share the view that neither environment is silent. There is no absence of sounds, particularly the sound of life, in nature or in cities.

Nature as pedagogue

Earlier I referred to nature as designer, and now I refer to nature as pedagogue. This is not an attempt to anthropomorphise nature, and it certainly is not an attempt to separate nature from human culture, which is ecosophically interrelated as will be discussed below. Considering nature as pedagogue is synonymous with immersion in nature, where natural soundscape designs are perceived through listening; that is, nature as pedagogue can be appreciated experientially through an immersion in the natural world where 'deep listening' can reveal its compositional subtleties and design configurations. Pauline Oliveros, the pioneer of the deep listening approach, describes deep listening as "listening in every possible way to everything possible to hear..." (Deep Listening Institute, 2013, para.6), and "learning to expand the perception of sounds to include the whole space/time continuum of sound – encountering the vastness and complexities as much as possible" (Oliveros, 2005, p. xxiii). Improvisational musician, Hodgkinson (1996, p.59), describes his observations of shamanic composition as emerging through "the very close connection made between the natural environment – considered as sound – and the inner states of a person's being". Both musician's ideas suggest deep listening as a pedagogical tool for developing an awareness of the subtleties of natural soundscapes, where immersion brings to the attentive listener an awareness of nature's capacity to afford altered perceptions. For example, the stillness of a soundscape transformed: by the sudden gush of wind in the overhead leaves of a tree; the scurrying of an animal beneath the undergrowth; the burst of activity of birds preparing for an oncoming storm; it is these continuously shifting soundscapes of nature, with the capacity to transfigure everyday human experience, which can inform the soundscape artist in the creation of urban soundscape designs. Krause's niche hypothesis and Hempton's silence, in this context, do not simply become rallying cries for the protection of nature's soundscapes from the interruptions of human-induced noise, but rather, they become tools for understanding the effects of nature, which can be transposed upon the noises of the contemporary urban environment.

Acoustic Ecology and Structuralism

Structuralism and sound

The philosopher Jean-Francois Augoyard's book *Step by Step: Everyday Walks in a French Urban Housing Project* considers the act of walking from a structuralist perspective. The study is extraordinary for its capacity to eschew the intentions of urban designers and planners, instead reading the landscape through the various observable modes of inhabitant walking and perceptions of space. So, what seems like a banal act in a planned environment becomes a rich array of imaginative responses to the everyday. CRESSON, established by Augoyard, applies a structuralist approach to understanding urban soundscapes, in which a multiplicity of sound effects are identified and discussed (See Augoyard and Torgue, 2005). The sound effects, interdisciplinary explanations of the diversity of perceptual encounters possible in urban spaces, explores the complexity of urban soundscapes through human perception. The WSP and WFAE, primarily concerned with preserving natural soundscapes and eliminating urban noise, have been less productive in exploring the complexities of urban soundscapes; however, there are notable exceptions: Truax's *Handbook for Acoustic Ecology* is replete with examples of urban sounds (see Truax, 1999) and Westerkamp's compositional study, *A Walk Through the City*, offers re-perceptions of city noises (see Westerkamp, 1981). An exploration of structuralist approaches, however, offers abundant potentialities for compositional, artistic and design responses to existent urban soundscapes.

Repatterning the urban soundscape

Generally speaking, a structuralist approach to understanding urban soundscapes would seem at odds with the activist intentions of the WSP and the WFAE, which tend towards judgments, rather than analysis, of the urban soundscape; however, Schafer makes some intriguing comments regarding soundscape design which can be interpreted from a structuralist perspective. Schafer (1993, p.103) writes "the basis of all soundscape design ought to be to develop the artful patterning of what is already there," and that:

> …refrigerators, vacuum cleaners and air-conditioners perform services originally provided by nature, and we might try to endow them with sounds reflecting this fact (Schafer, 1993, p.111).

An immediate reading of these quotes suggests an aesthetic judgment of the contemporary soundscape as in need of renewal; however, as I have argued in a recent paper (Lacey, 2013: paper in review) the argument may be interpreted as 'identifying patterns of sound objects in space, the act of which affords their repatterning'. So rather than artfully patterning the soundscape, the soundscape designer can repattern existing sound objects within a soundscape; this approach allows for acknowledgment of pre-existing patterns, that analysed structurally, can become a tool for design. Similarly, Schafer's comment that we may try to identify the natural referent of urban sounds and endow them with the quality that nature provides these sounds in their original context, enables the designer to challenge codes represented by sound objects; if noise is representative of power, then a creative reconceptualization of urban sound objects could recode their presence with creative-reinterpretations of their original natural expressions: codifications of power are temporarily removed and/or replaced with codifications of the creative.

Referencing nature's repatternings

Nature can be conceived as continuously repatterning its soundscapes. Any natural space contains an arrangement of sound objects; the listener will hear this arrangement, but the arrangement's pattern will continuously alter depending on the wind, rain, time of day, activity of animals: a continuously shifting soundscape of subtle repatternings. Thus, it is not that nature artfully patterns, which implies an arranged soundscape composition, but continuously repatterns the soundscape as ever-shifting milieux of existent sound objects. The urban soundscape has its own set of sound objects in any given space, however, due to the repetitive nature of the everyday, these sounds repeat their timbre, spectral characteristics, even duration and event time on a day-to-day basis. This is a consequence of the structuring of urban sound objects by codes of power (technological, social organisation) within space,

from which a quotidian pattern emerges that diminishes potential lived experiences to a minimum of subjectivities (or imaginative potentialities). A soundscape designer that references the effects of nature may attempt to endow urban sound objects (e.g. air-conditioning sounds) with its natural referents by introducing sounds that diversify its spectra, timbre, duration, gesture (e.g. wind and water), for the continuous repatterning of urban soundscapes that afford the evocation of surprise, diversity, emergent states, even beautific experience (described by CRESSON as the sound effect, sharawadji [Augoyard and Torgue, 2005, p.117]) that nature achieves in its everyday soundscapes.

Ecosophical applications to acoustic ecology

Nature-culture dichotomy

As previously suggested, encouraging a dichotomy between nature and culture is problematic, as the complexity of the nature-culture relationship is simplified to a conflict between the natural world and human culture. The French psychotherapist, Felix Guattari, developed an approach that overcomes the nature-culture dichotomy called ecosophy (as distinct from Naess' ecosophy). Guattari divides ecology into three registers – the environment, social relations, and human subjectivity (mental space) – which interrelate in complex ways. Guattari explains that issues threatening the environment are equally applicable to the other two registers. Guattari (2000, p.19) opens his book by quoting Gregory Bateson: "there is an ecology of bad ideas just as there is an ecology of weeds," which compares the homogenising effect of the spread of weeds on the environment as comparable to the effect of the spread of advertising on social relations and human subjectivity. Regarding soundscapes, the intrusion of noises in natural spaces (see above: considering natural sounds) is equally problematic for social relations, where a deterioration in human communication is caused by the masking of sounds at the human scale, as it is for mental space, where the capacity of imaginative relationships with the city is threatened by the repetitive motifs of limited sound-types. Rather than separating urban space and natural space, ecosophy allows us to equate threats to the environment with threats to mental space and human relationships. Thus, it is not humanity as aggressor towards nature, but increasing homogenisation that is reducing nature, self and society to conditions characterised by what Guattari (2000, p.45) describes as a "pervasive atmosphere of dullness and passivity". Understood ecosophically, the soundscapes of nature and the urban are not in conflict, but are simultaneously threatened by the homogenising effects of functionalisms and standardisations upon urban and natural spaces; therefore, all three registers are threatened by the ever-increasing din of urban noise, which is the sonic expression of power – over natural spaces, urban spaces, and the spaces of the mind.

Acoustic ecologist as designer

Urban noise has been described in two ways in this paper – the sonic expression of power in space, and as a transformative agent. It could be speculated that the sonic expression of power is transformative in itself: a destructive transformation reducing the diversity of soundscapes (natural and urban) to homogenous states; similarly, homogeneity is ecosophically destructive in its reduction of human subjectivities to limited experiences of the sound environment, and the deterioration of social relations into individual interiorizations as the soundscape becomes increasingly banal. It is here, at the nexus of ecosophy and listening, that opportunities emerge for the acoustic ecologist to transform noise, through design, into altered listening experiences. Diversifying the urban soundscape has the potential to multiply human subjectivity and catalyse new social relations, which if we consider the three ecological registers as interrelated, translates to renewed interests in the multiplicity of the world's environments: surely, a stimulated and diverse humanity is more likely to celebrate the majesty of Earth's diversity than a subservient and alienated populace. If urban noise is a transformative agent, the acoustic ecologist can intervene to influence the emerging order that noise-as-transformation beckons; that is, developing a mythological perception to inform soundscape design.

Acoustic ecologist as activist

Interventions upon noise-as-transformation is more relevant to urban spaces than to natural spaces. Nature already contains processes for transformation and change, whereas modern cities have a

tendency to fall into the repetition of the similar, unless there is a concerted effort (such as interventions) to avoid this. Whereas nature's homogenisation is caused by external agents (motors, weeds etc), modern cities generate their own homogenising agents, which subsequently spread into natural spaces (as they do into social spaces and mental spaces). Consequently, the goal of the acoustic ecologist is two-fold: firstly, as activist to assist nature in preserving its internal processes for the emergence of natural soundscapes; and secondly, as soundscape designer in transforming urban noise into diverse experiences by designing urban soundscapes with the effects of nature. The dual approaches are interrelated: as explained, immersion in natural soundscapes through deep listening reveals creative approaches to urban soundscape design, thus the preservation of natural soundscapes becomes a tool for urban soundscape design, the diversification of which evokes a multiplicity of subjectivities and social relations, which leads to a renewed appreciation, through emancipation from passivity, for the diversity of the world which humanity inhabits. Such is the possibilities evoked by ecosophical applications to acoustic ecology.

Evoking the imaginary through urban soundscape design

Urban imagination

Designing urban soundscapes for the effects of nature seeks to evoke the imaginary, which Augoyard (1979, p.155) describes as existing "beneath the apparent solidities of planned spatiality and functional uses" of urban spaces. The last remaining fragments of natural environments under attack by the spread of homogenisation can be considered as synonymous with human imagination, which is suppressed by the functionalisation of space, by bureaucratic decrees. Yet the imagination is always present as potential and able to be activated, just as the natural environment, given the space to regenerate, can recover its necessary conditions for planetary survival. Urban soundscape designers, working from an acoustic ecology position, are able to rebalance urban soundscapes towards imaginative lived experience with interventions and installations that gesture toward nature's capacity to create diverse soundscapes, encouraging reflection, excitement and mystery in the listener. If the world is an interconnected mesh, then surely the activation of the human imagination in our increasingly homogenised urban soundscapes will flow towards an awareness and appreciation and thus protection of the diversity of the world in which we live – such is the intention of designing urban soundscapes for the effects of nature.

Urban soundscape design for imagination

Urban soundscape designers (for further discussions on this practice see: Schafer, 1993, p.101; Truax, 2001, p. 243; Hellstrom, 2003, p.34) have the potential to create diverse acoustic ecologies in urban spaces: spaces designed for the emergence of the imagination. Diversifying homogenous soundscapes by repatterning existent sound objects into continuously shifting milieux becomes a critical ecosophical act of the acoustic ecologist. The effects of the intervention can be subtle and may or may not be noticed by a passer-by, just as the subtle effects of nature may or may not be noticed depending on the attentiveness of the listener; however, potential emergent listening experiences, encouraged by the subtleties of repatternings, may irrupt the sensory apparatuses towards subjectivities and interconnectedness. Why? Because the self, rather than being bombarded with experiences by the mass-media—advertising complex (Guattari, 2000, p.47) and the repetitive monotonies of city noises, is compelled to respond imaginatively to perceived subtle shifts in the soundscape. It could be argued that the occasional loud burst of sound as produced by nature should be considered in urban soundscape design, though thankfully lightening storms remain a feature of urban soundscapes! Besides, the existences of loud noises in urban spaces, particularly motorised noises, are omnipresent; it is the subtle that is wanting. If city inhabitants are withdrawing to their interiorities, as suggested by Truax's alienated listener and Michael Bull's (2000, p.143) indifferent personal-stereo user, then soundscape interventions become a way to sonically reach inside the listener and tease out subjectivities through the stimulation of the imagination. As Augoyard (1979, p.157) states, "the imaginary weaves beneath each present lived experience a ground the imaginary immediately gives to it as world." The potential for emergent subjectivities is endless if the acoustic ecologist perceives the

city as imaginative ground, accessible beneath the functionalities, the controls, and the powers of space.

Mythologising noise

Returning to the idea of deep listening, nature provides an abundance of lived experiences for the listener. Hempton's (2009, p.27) description of the endless diversity of musicality inherent within valley streams is evocative not just for its argument for the preservation of natural soundscapes, but in the subjectivity that Hempton's experience clearly affords, "I can hear the river singing. Actually the whole valley is singing" (p.26). The comment is suggestive of a diverse mental ecology responding to a diverse environmental ecology. And of this experience, he continues:

> When listening to this music of place…I am inspired to be a better neighbour, a better parent, a better child because I feel part of something much bigger (p.27).

So why can't this experience be reversed, from the urban soundscape towards a renewed experience of the world? The acoustic ecologist has almost exclusively denigrated noise in all its forms, particularly for its intrusions upon the kind of experiences Hempton describes; however, the acoustic ecologist can mythologically engage with the urban through re-perceptions of noise - Noise as a rising voice, representative of transformation. Simply fighting against noise is not enough; it requires creative engagement with its transformative properties, particularly its parasitical imperative to reorder present relations. To perceive the repetitiveness and homogeneity of noise and repattern it into the subtle experiences that nature so effortlessly affords (for imaginative engagement, the emergence of subjectivities) encourages the diversification of the three ecosophical registers, which, through imaginative enrichment of social and mental ecologies, can evoke an awareness of something "much bigger" – the environmental ecologies of the world in which humanity resides.

Soundscape Interventions

Having suggested an alternative approach to acoustic ecology that equally values natural and urban soundscapes through an interrelated soundscape design approach, I want to now briefly touch on two case studies that sought to transform noise through soundscape intervention. The first case study *Silencing Urban Exhalations* removed a noise source for the emergence of social space. The second case study *Revoicing the Striated Soundscape* re-patterns existing urban noise for the emergence of sonic space that references the effects of nature.

Silencing urban exhalations

Noise is power. This is a maxim repeated by many philosophers, including Serres (1980, p.141): "Everyone knows that the one who has the power is the one who has the source and emission of sound". The intervention, *Silencing Urban Exhalations* (see Lacey 2012 for a detailed explanation), explored this notion by removing a noise source, which allowed the emergence of the normally suppressed sounds of human activity (this intervention was an iteration of a related project, see Harvey, 2008, p.56). The targeted noise source, which removes exhaust fumes from an underground delivery bay, was an exhaust fan situated directly in the middle of social space at RMIT University, Melbourne (see Figure 1). The space is considered social due to its weekly markets, location for student activities, as meeting point, and as transitory space between three important buildings. This is the simplest of interventions, yet in a way the most complicated; the meaning of noise-is-power becomes most apparent when the removal of a noise source is attempted. Although the delivery bay is rarely utilised, and consequently, the exhaust outlet provides a function of low importance comparative to its considerable interruptions in the accompanying space, the outlet finds itself at the center of a network of bureaucratic relations that are highly protective of the noise's existence. As I was a university lecturer completing the intervention as part of a soundscape studies class I was able to find my way through the various controls that protected the noise; however, for the outlet to be shutdown for just half an hour it took approximately three months for agreements to be reached with various manifestations of bureaucracy (Lacey, 2012, p.16).

Figure 1: Site of the soundscape intervention *Silencing Urban Exhalations*. The exhaust fan outlet is located in the center of social space. Note the market stalls to the left of the picture.

Noise as parasite in this case can be characterised as transformative, but transformative towards an ordering of social relations that are characterised by the absence of human voice and activity; indeed, when the noise source was removed it was remarkable to hear how instantly human voices and the sounds of the adjacent market filled the space. A sonic fog had lifted, and the sounds of human activity, now foregrounded, were able to temporarily appropriate the space. There was a noticeable shift in social relations during the shutdown. People could be observed congregating around the outlet and talking (normally, at best, two smokers might huddle closely and talk), and due to the absence of the masking effect caused by the noise source people were able to hear each other speaking at a large distance relative to when the exhaust fan was operative. Subtle sounds emanating from the market like the knock of a belt buckle against a table or the laughs of a stallholder could be heard. These observable changes pose the question, if a perceivable shift in social relations can be observed in a half hour shut down what would the permanent removal of noise from vast areas of the city achieve? Would the alienated listener transform into the engaged listener thus activating social relations, and diversifying human subjectivity away from its tendencies towards homogeneity? Possibly, however, the power relations protecting the noise source ensured the exhaust outlet was back on precisely half an hour after it was switched off (and it has never been off since) which demonstrates the difficulty of any attempt to maintain the absence of noise on a large scale for any length of time. Considering the power relations that protect noise the original intentions of the WSP to remove noise seem unrealisable; thus creative approaches are required that challenge the dulling affects of these homogenous noise sources.

Revoicing the Striated Soundscape

A dominant noise source in most urban spaces is the air-conditioner. It has become ubiquitous as both a climate controller within the office spaces and homes of urban spaces, and simultaneously as a

source of unwanted noise dumped in laneways and back alleys (Lacey, 2010, p.17); indeed, it is becoming increasingly difficult to find outdoor locations in the city or the suburbs where air-conditioners or ventilation systems are not dominating the soundscape (besides, of course, for spaces dominated by the typically louder sounds of motorised traffic). *Revoicing the Striated Soundscape* (see Royal Melbourne Institute of Technology, 2013) is a soundscape intervention that sources the repetitive and homogenous noises of air-conditioners within a site-specific laneway and recomposes the noises into multiple soundscape compositions. Similar to the previous intervention the selected site is dominated by noise-as-power, the primary concern of which, in this case, is to provide continuous climate control to the internal spaces of buildings that house city workers and consumers.

Figure 2: Site of the soundscape intervention *Revoicing the Striated Soundscape*. Note the four air-conditioning units adhered to either side of the laneway walls. Each unit houses a speaker that plays spatialised soundscape compositions. Sounds were pre-recorded in the site and transformed in the studio.

Four speakers were hidden inside otherwise empty air-conditioning casings and networked to a computer system. Speakers played sounds previously recorded in the laneway and subsequently transformed in the studio. The installation utilised the conceptual tool ‘repatterning the urban soundscape’ (described above); by recomposing existent sound objects the typical pattern of air-conditioning sounds were continuously repatterned, the constant variations of which afforded diverse listening experiences. Typically, there is little reason to listen to everyday urban spaces where sounds are unchanging and repetitive; sounds that are not only indifferent to the passer-by but simultaneously mask the sounds of the inhabitant’s body, which sonically, and consequently mentally, disappears from space. This poses the question, if the space of nature provided similar listening experiences would listeners also be indifferent to natural surroundings; the same bird sound each day, the same gust of wind, each without timbral or dynamic variations: would the bush inhabitant withdraw to their own interiority and cease interest and connection with the world around them? However, as discussed, nature is continuously shifting its soundscapes, which keeps the listener engaged, interested, mystified,

cautious, exasperated; similarly, the soundscapes of the intervention provided a continuous repatterning of sonic space, which ensured that those who ventured through on a daily basis would encounter continuously shifting soundscapes.

The intervention site was similar in effect to discovering diversity in nature, the equivalent to stumbling across a unique glade or hidden cave entrance that affords altered perceptions of the environment, the emergence of subjectivities, and desire for repeat visits. Anecdotal evidence was collected which reflects this claim, while concomitantly demonstrating a diversification of mental ecologies and social ecologies. Regarding mental ecologies, a number of people I encountered in the space described reactions to the installation in diverse ways; a recurring theme being the experience of introduced sounds blending with the existent soundscape causing ambiguous, thus imaginative, listening experiences. Imaginative reactions were common including a sense of helicopters passing overhead, train tunnels existing below the site, wind producing odd sounds as it passed though the air-conditioning vents, and that the air-conditioners were operating in unusual ways. Others enjoyed spending their lunch breaks in the space and engaging with the soundscapes, in concentrated (perhaps deep) listening, which offered an alternative to the banality of the everyday. Regarding social ecologies, individuals could occasionally be seen engaging with one another as they exchanged opinions about the source of the sounds, and groups of friends would gather in the site, which provided an immersive experience different to the everyday; groups of people could be observed socialising, creating (particularly street art) and discussing.

Noise, in the case of the intervention, becomes a heterogeneous experience, the limits of which are set only by the imaginative responses of the listener. This is noise as creative design, which seeks the emergence of mental and social ecologies. It is of course difficult to discern any flow on effects for the diversification of environmental ecologies, although at least one listener described the effect as being similar to the subtle shift of sounds that might be encountered in nature, in effect reminding him of the wonder of natural spaces. Is it possible that a city transformed on a large scale, towards diverse and shifting urban soundscapes, may encourage creative emergences in the participants of everyday life, who engaged, interested, perhaps even perplexed, direct subjectivities outward into the world? As suggested above, the diversification (through preservation) of environmental ecologies is more likely to be encouraged by a creative populace attuned to the wonders and complexity of nature, than soporific inhabitants pacified by the homogeneity of space.

Conclusion

Acoustic ecology has been crucial in bringing the world's attention to the threats human-induced noises pose to natural soundscapes and to the inhabitants of urban soundscapes; however, the movement has tended to apotheosise the natural at the expense of the urban due to the acoustic ecologists' general disdain for noises. To creatively respond to the increasing global spread of noises and the concomitant homogenising effect upon the three ecosophical registers, this paper suggests that acoustic ecologists reconfigure their perceptions of noise from that of an intolerable profanity to that of a transformative agent which is suggestive of the establishment of a new order. What the new order is, is unknown; however, through creative (and mythological) engagement with noise-as-transformation, acoustic ecologists are in a position to diversify homogenous urban soundscapes thus affecting the diversification of mental and social ecologies. The acoustic ecologist can achieve this through a deep listening to natural soundscapes, where the 'effects of nature' can be perceived and transposed upon the soundscapes of the urban. An effect of nature's soundscapes, as described in this paper, is the continuous repatterning of existent sounds objects; a phenomenon that can be applied to the homogenous mass of urban noises, setting them in motion, revealing interpretations of their natural referents and thereby transforming urban environments into spaces for creative emergence. Designing for imaginative engagements in diverse urban soundscapes may flow towards a respect and desire for the protection of the world's ecologies; the interconnected mesh of environmental, social and mental ecologies in which humanity resides.

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16. CARRIER PIGEON-LIKE SENSING SYSTEM: BEYOND HUMAN-RED FOREST INTERACTIONS

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Abstract

The Carrier Pigeon-like Sensing System (CPSS) is a future-present computing archetype that will enable the human race to observe inaccessible natural spaces, such as the contaminated forests around the Fukushima nuclear power plant. The system aims to elucidate the scientific knowledge underlying the self-repair mechanisms of contaminated natural areas and allows users to maintain a connection with forests in the absence of any human intervention for future societies. This novel sensing system can be used to create a sustainable balance between humans and animals to ensure that the self-repairing process of contaminated natural areas can be applied anywhere in the future. This paper describes the theoretical underpinnings of such a sensing system through designing a CPSS.

Keywords: Computing, nuclear, sustainable, sensing system, bioacoutstic sound streaming

Introduction: Contradictive Link between Human Beings and the Red Forest

Carrier Pigeon-like Sensing system (CPSS) is a future-present archetype in network computing that will enable the human race to observe inaccessible and contaminated forests around the Fukushima nuclear power plant. The system employs wildlife-borne sensing devices which have animal-to-animal internet sharing capability and which can be used to expand the size of monitoring areas where electricity supply and information infrastructure is either limited or nonexistent. In so doing, information can be collected from remote areas cost effectively and safely. The system is based on the concept of *Human-Computer-Biosphere* Interaction shown in Figure 1. The primary aim of the system is to elucidate the self-repair mechanisms that arise in contaminated natural areas and to allow users to maintain a connection with the forest without human intervention in order to develop sustainable and remote future societies.

Our relationship with nature has changed constantly over the course of human civilization; however, despite these changes, the one constant has always been that nature is destroyed in the process of scientific advancement. After the nuclear accident at Chernobyl in 1986, the Soviet Union created a permanent exclusion zone in the forest surrounding the nuclear site (Red Forest). Despite the extremely high levels of radioactive contamination, animals returned after only 20 years. At the time of the accident, people had no means of investigating or remediating the natural system and could not obtain any “knowledge required for healthy living” as a result (Alexakhin et al. 2006, Mycio, 2006). After the accident at the Fukushima nuclear plant in Japan, foreign countries were the first to begin scientific investigations into the mechanisms involved in the remediation of contaminated area. If this situation continues, the ripple effect brought about by the “knowledge required for healthy living” will surely bypass the human race.

In a previous study, the authors developed a networked bioacoustic streaming and recording system that continuously streamed, in real time, environmental sounds from an area of subtropical forest on Iriomote Island, moving water from a pond in Tokyo, water-powered musical instruments in a Japanese garden in Kyoto, and a street in Mumbai, India using a series of networked microphones (Kobayashi et al. 2009). The authors also introduced the concept of Human-Computer-Biosphere Interaction (HCBI) (Kobayashi et al. 2009) for creating a relationship with nature and HCBI clothing, called the wearable forest, which forges new relationships between humans and nature through a human-wildlife, wearable, interaction system that facilitates non-verbal interactions with nature in our

daily life through the telepresence of different species. The system described in this study, the CPSS, presents the possibility to balance the apparent contradiction between seemingly opposite forces of Human Beings and the Red Forest using the Fukushima Nuclear disaster on 11 March 2011 as an example. The Fukushima Nuclear disaster is the largest nuclear disaster since the Chernobyl disaster of 1986.

This paper presents our vision of a HCBI by introducing the concept, related work, a developed advanced interface, and related discussions. The paper is not only intended to propose a solution to a single problem, rather, it proposes a new view of HCBI-based designs and interfaces to support our future society using a multidisciplinary approach from the single problem

Background: A Matter of Survival on the Day

When the massive earthquake hit on March 11th, one of the authors was in Tokyo lying in bed, a little tired after having worked through the night. The quake started as a weak vibration and a low frequency sound, but then became so powerful that it jolted him wide awake. He expected it to eventually stop as usual, but this time it was different. Everything slid off the table. Pans, plates, and utensils were clashing together and fell from the kitchen cabinet. A tall mirror, which hung on the wall, swayed and almost fell.

The shockwave shook the whole building from its foundation up. At that moment, the collapsed buildings of the 1995 Kobe earthquake flashed across his mind. He walked on his hands and knees and opened the front door to secure a means for evacuation. After he confirmed the safety of family members by cell phone he watched the events unfold on television.

Interruptions to cellular networks and power blackouts began soon after the quake, and for a time he lost all means of communication. It was a real "Dialogue in the Dark" outside after sundown. All of the factories and stores suspended their activities as night fell; even dogs on the streets seemed to sense the unusual atmosphere and did not bark. Police officers were standing in the middle of intersections, directing traffic with hand signals illuminated by the headlights of fire trucks. People crossing the intersection offered "thanks" to the officers and many walked home in silence.

The cashiers and staff at the grocery store used flashlights to assist customers with purchases. A small radio behind the casher broadcast the voice of the Japanese Emperor who was comforting the entire nation in the dark. It seemed like the last day of World War II, which the author had only read about in history books, in that he had never seen such warm interactions among ordinary citizens. Outside the store, when he looked up at the night sky, stars were shining more brightly, more brightly than he had ever seen them shine in Tokyo before. However, elsewhere the situation was devastating.

At the time of the Fukushima Nuclear disaster, people in Japan had no means of investigating the damage. As a result, they were unable to acquire ‘the knowledge required for healthy living’. Only foreigners were able to start investigating the earthquake immediately after the accident at the Fukushima nuclear plants; Japanese officials then followed them as time progressed. If such a situation were to continue into the future, the ripple effect brought about and the ‘knowledge required for healthy living’ would certainly bypass by the human race. It is therefore important that we prepare the necessary logistics and the research in order to prepare for such events in a sustainable future society.

Problem Statements

Ecological monitoring of wild animals involves the analysis of information related to target animals, such as data related to their location and prey preferences in actual environments, as well as data related to meteorological conditions. Using ubiquitous and wearable technologies, it is generally considered likely that species inhabiting environments near urban areas (human settlements) can be

monitored effectively given the relatively close proximity of these environments to urban areas and the availability of electric power, information infrastructures and information systems such as those associated with cellular phones (Ueoka 2001, Lee et al. 2006).

However, in more remote areas, such as in the contaminated home ranges of wild animals, the availability of electric power and information infrastructure required for monitoring wild animals is either limited or non-existent. This is primarily because it is typically not economically viable to install such infrastructure-based services in areas such as wildlife refuges where the number of potential users is low.

Furthermore, in areas where there are no infrastructure networks, predicting the behaviours of species with extensive home ranges (on the scale of several kilometres) is difficult. Although field surveys of such species are conducted periodically, monitoring target species in hot and humid forests or in radioactive environments can impose a considerable burden on the observer. It was therefore necessary to develop methods and techniques for maximizing monitoring performance while using the fewest possible resources.

HCBI Concept Overview

The CPSS is based on the HCBI concept described in Figure 1, and which is an extension of human-computer interaction (HCI) (Kobayashi. 2010**)** and human-computer-pet interaction (HCPI) (Lee et al. 2006). The field of computer-supported cooperative work (CSCW) is based on such computer-interaction paradigms to support specific activities. For instance, we exchange our ideas, thoughts, theories, and messages by encoding them into transferable words, communicating them in space through computer systems, and then decode them. However, in our daily lives, we implicitly exchange and share a great deal of additional non-verbal information, such as the presence and mood of others, in order to maintain our social relationships (Itoh et al. 2002).

The consideration of implicit (background) information opens up new possibilities for interaction through non-linguistic, wearable forms and non-verbal, remote communication among different species. Wearable computing devices enable us to extend our spatial interactions and to develop human-to-human communication beyond physical distance (Lisa 2004, Seymour 2008, Ueoka et al 2009). HCPI, as described in Figure 1, is a novel type of physical interaction paradigm that proposes the creation of a symbiosis between humans and pets through computers and over the internet as a new form of media. Botanicalls was developed to provide a new way for plants and people to interact in order to develop better, longer-lasting relationships that go beyond physical and genetic distance (Bray. 2006). Thus, computer systems become a medium through which a telepresence can be expressed among different species in the biosphere through non-linguistic means that are perceived and understood by individuals, violating the rules of linguistic science (Alex. 2001).

However, irrespective of how advanced the technologies are, these are spatial interactions. We expect some feedback from others before we issue the command to end an interaction. On the contrary, there are many temporal interactions in our daily lives. The sounds of singing birds, buzzing insects, swaying leaves, and trickling water in a forest implicitly imprint the presence of space in our minds. When we are away from a forest, recalling the memory of a forest takes us back to the same place. The crucial factor here is not the means of conveyance (words or language), but the ‘something’ that hovers around; an atmosphere that we cannot identify exactly but that lasts beyond generations. This interaction follows the theory of natural selection proposed by Charles Darwin. The theory of evolution, which has become one of the fundamental cornerstones of science, was introduced to readers in his book, the *Origin of Species,* that he wrote after visiting the Galápagos Islands (Darwin. 1859).

The author proposes that, much like elements of natural selection, the concept of HCBI can be extended to spatial interactions from countable objects, such as pets and plants in space, to their temporal environment, which is an uncountable, complex, non-linguistic, something beyond

generation. In the HCBI framework, the sounds of a forest or other natural environments are all information cues that help us to understand natural selection. Thus, through HCBI, we can experience the wonderment of the global ecological system, with all living beings and their relationships, including their interactions with the elements of the biosphere. With HCBI, we begin to interact with inaccessible ecological natural systems beyond space and time.

HCBI System Design: From a Law of Animal Behavior

Natural communities contain a wide spectrum of life forms that interact with each other, and it is generally agreed that the essence of ecology is the study of ecological interactions among species in animal communities (Begon et al. 1996). In particular, animal communities in tropical forests have extremely complex interactions involving numerous species (Ricklefs et al. 1993, Leigh et al. 1996). Indeed, the structure of natural sounds in rainforests convincingly demonstrates the magnitude of the extraordinary relationships that exist among the many insects, birds, mammals and amphibians that inhabit these environments. If one creature starts vocalizing, others often immediately join the chorus (Bernie. 1987). These spatial-temporal interactions between animals vary depending on the biological diversity of the natural habitat that has arisen as a result of natural selection.

To establish CPSS, an HCBI interface artificially creates a virtual acoustical field to acquire a homing reaction. It is modeled on three kinds of natural interaction: interspecies predator-prey relationships, intraspecies communication, and mixed-reality intraspecies communication.

First, a predator hunts for prey in its native habitat as shown at the top of Figure 2; the predator uses bioacoustic information as a cue for detecting the existence of its natural prey in the surrounding area. A scarcity of prey in a specific habitat can indicate the absence of specialized predators as a result of natural selection.

Secondly, intraspecies communication is considered to be a chorus produced by a group of the same species in Figure 2 (middle), and is similar to the Packet Internet Grouper (PING) command of the Internet Control Message Protocol between two computers (Muuss. 1984). A single individual, the caller, starts calling other individuals to confirm their presence. The other members of the species then recognize the call and report their existence to the caller. This is also as a result of natural selection.

Third, a species can conduct intraspecific communication in mixed reality. The bottom of Figure 2 shows a user playing back a pre-recorded sound of an initial call from an acoustic speaker; the speaker is placed in the natural environment and is controlled by a remote-controlled PC over the internet. The real frogs answer the initial call and report their existence. This is a new synthesis of natural selection and cybernetics.

The initial call (the virtual call played by the speaker) can deceive the real frogs into believing that it was made by a real frog in the vicinity. Thus, such human-biosphere interactions through computer systems can breach spatial-temporal barriers. This study presented here used bio-acoustical information to develop a spatial-temporal interaction model, and proposes a novel cybernetic interface using mobile technology for CPSS in scientific applications.

CPSS: From a Law of Homing Pigeons

Human communities employ a wide spectrum of technologies that interact with nature. It is generally agreed that one of the most ancient forms of information communication technology involves the use of carrier pigeons; a homing pigeon that can carry messages and then find its way home over extremely long distances. In the United States, the 1800 km-long Pigeon Race (sport of releasing specially trained racing pigeons, which then return to their homes over a carefully measured distance) is the longest pigeon race in the world (Walcott. 1996). In the field of computer network engineering, D. Waitzman announced a proposal to carry Internet Protocol (IP) traffic by birds such as homing

pigeons (RFC 1149) on 1 April 1990 (Waitzman. 1990). Even though this was an April Fools' joke, several experiments proved that the method was effective.

However, only homing pigeons are capable of performing such task specific activity. Other animals are not reported to as yet. In sum, to be able to monitor the contaminated home ranges of other wild animals, where the availability of electric power and information infrastructure required for monitoring wild animals is either limited or nonexistent, it is a necessary to design a CPSS. In doing so, we are able to observe inaccessible natural spaces, such as the contaminated forests around the Fukushima nuclear power plant. To date, infrastructural limitations have meant that the following two methods are typically used to monitor wildlife.

For example, a long-range sensor approach can be used, such as a telemetry system that employs signals from a radio transmitter attached to a target animal and a receiver which then estimates the location of the animal. Using the long-range sensor approach, observers use a portable receiver to estimate the current location of a target animal by measuring the strength and direction of radio signals transmitted from animals that have been fitted with radio collars. Although numerous species have been observed using this method, the geographical characteristics of an animal's environment can have a marked impact on the reception of the transmitted radio signals. In addition, using this technique requires considerable experience and skill on behalf of the observer.

In addition, the total mass of a transmitter system that can comfortably be borne by an animal is limited to 2% or less of the animal's body weight. Consequently, large animals like elephants can wear systems weighing up to 100 kg and mid-sized animals (e.g., the size of a small cow) can bear loads of up to 6 kg. As a result, there has been considerable interest in research and development of ubiquitous sensor systems for monitoring large- and medium-sized terrestrial mammals, including systems based on wireless LAN (Juang et al. 2002, Thorstensen et al. 2004), ZigBee (Nadimi et al. 2008), infrared sensors (Kobayashi et al. 2006), motion control using actuators (Wark 2007), virtual fencing with GPS-based electric stimuli (Bishop et al. 2007), and so forth. However, small mammals and birds are usually only capable of carrying loads of ≤75 g or ≤30 g, respectively, which limits the range over which such systems can be applied. Furthermore, in the case of wild animals, it is not usually possible to recapture a collared animal every two or three years for battery replacement (e.g. GPS-based studies for elucidating the migration routes of migratory birds; Argos System 2007).

To achieve these aims; outdoor, remote, acoustic information acquisition devices have been constructed and deployed (Kobayashi. 2010). Other methods have also been employed to detect living organisms; for example, a musical instrument called a Theremin that utilizes indoor capacitance has been used to register the presence of laboratory rats, and problems associated with this method were clarified (Skeldon et al. 1998).

Beyond Human-Red Forest Interaction: Discussion

As explained earlier, after the nuclear accident at Chernobyl in 1986, the Soviet Union created a permanent exclusion zone (CEZ) in the forest surrounding the nuclear site (known as the Red Forest after the disaster because the trees turned red when they died). Despite being the worst nuclear disaster to date, the event had a positive impact on the biota in the CEZ. Specifically, the recovery observed in the biota of the CEZ due to the cessation of human activities has been dramatic (e.g. due to the termination of agricultural and industrial activities and the accompanying environmental pollution in the most affected area). As a result, the populations of many plants and animals have increased and the CEZ now supports many species that were previously rarely seen (Alexakhin et al. 2006, Mycio. 2006).

In the nuclear accident at Fukushima in 2011, the Japanese Government also established a temporary exclusion zone in the surrounding area. Despite the extremely high levels of contamination, people are scheduled to return home. As the number of repatriation activities has increased, so has the amount of agricultural and industrial activity. The increase in the anthropogenic activities has, in turn, had a

negative effect on the biota in the forest surrounding the nuclear site (CEZ). These activities increased markedly when the news media reported on the full extent of the environmental damage to the area. The reports prompted an increase in restoration-type activities, which in turn increased local repatriation activities, which together increased the negative impacts of both types of human activities on the biota in the CEA. Only foreign countries started investigating the effect of the disaster on the biota of the region immediately after the accident; the surveys by Japanese officials occurred gradually over time. Furthermore, as the cost of measures against contamination by radioactive materials increases throughout the world (7 trillion yen in 2030 according to the BP Energy Outlook 2030) it is important to be able to monitor the contaminated area.

We have more than 10 years of research and development experience with CPSS initiatives. The system has integrated the efforts of researchers with computers and the ecosystem (Figure 3), and can be applied to investigate ecosystems in remote and permanently restricted areas. (i.e. areas that are either too remote to be serviced by traditional communications infrastructure or that that have geographic attributes (e.g. terrain and vegetation cover that make monitoring difficult).

Our past achievements include:

- Conducting regional surveys of subtropical rainforest using a remotely operated sensor attached to endangered species and that enabled us to observe, probe and control behaviour.
- To predict climate change, we developed methods to "see and hear" the amount of long-term growth in mountainous rainforests.
- Assistance with environmental investigations into domestic and foreign cities, oceans, polar-regions and contributions of environmental educational material to the government and educators.
- We developed methods to assess the damage to agricultural and forestry areas.

Human beings seem incapable of peacefully coexisting with nature and the often-expressed desire for sustainable relations between man and the environment sometimes appears to be an unobtainable future dream. It sometimes seems that the best way to solve all of the world's environmental problems would be to destroy all civilizations. In ancient times, interactions between nature and human societies were significantly less frequent due to cultural and mythological reasons. Before human beings became capable of leveling mountains with heavy construction vehicles, humanity and nature were physically separated but spiritually and emotionally connected. Japanese farmers prayed to gods in seasonal festivals for the weather conditions needed to ensure successful crop production and the general population was taught to respect the gods that resided in and protected the mountains. Because of this, wild animals and their habitats in the mountains were left undisturbed for the most part and Japan's history and culture evolved in benevolent interaction between nature and humanity. Indeed, society and even business activities paid respect to the traditions and cultural aspects of nature until the human development process known as "Scientific Advancements" began spreading. However, through this project we will acquire world leading knowledge related to radioactive contamination resulting from the Fukushima nuclear accident by CPSS. Based upon the assessments by agriculture and forestry workers in that area, combined with specialists from around the world, we will finally gain 'the knowledge required for healthy living'. We will then release the obtained data to the public in real time.

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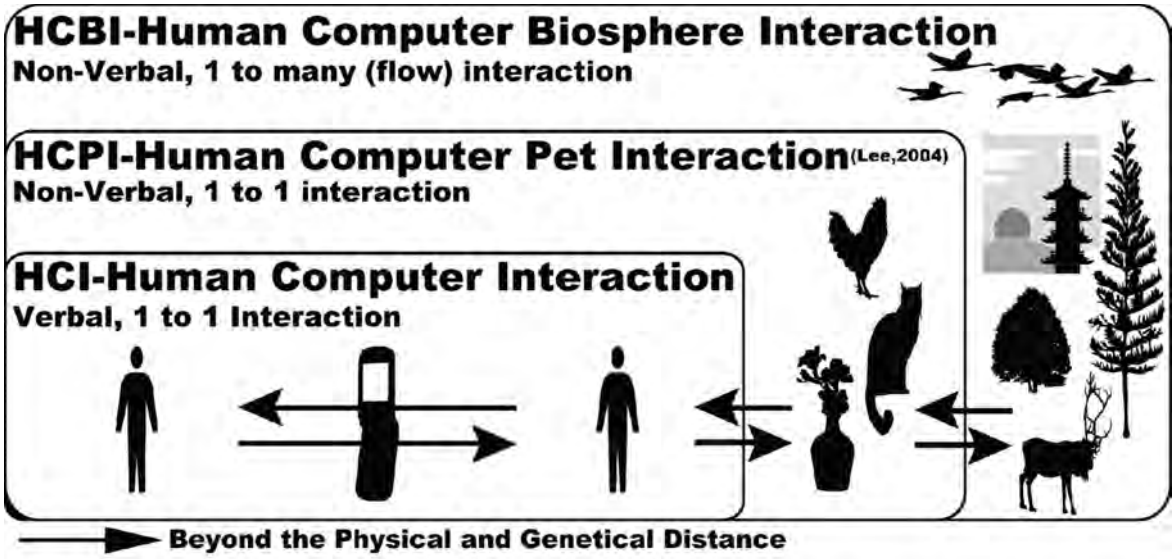

Figure 1. Human-computer-biosphere interaction (HCBI) concept; an extension of HCI and HCPI

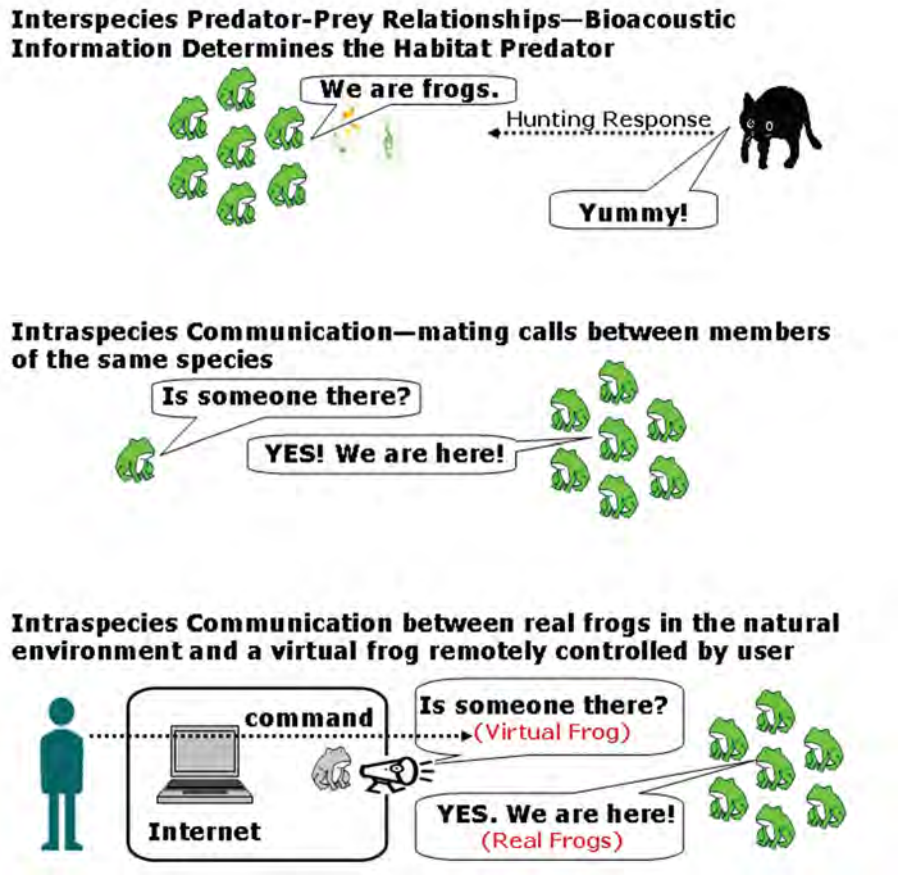

Figure 2. Interspecies predator-prey relationship (top), intraspecies communication (middle), and intraspecies communication in a mixed reality (bottom). © 2008 Hiroki Kobayashi.

Figure 3. Conceptual image of the Carrier Pigeonic Sensing System

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17. MUSIC FOR THE BANAL, THE OBVIOUS, THE EVERYDAY: THE INTERROGATION OF THE OBJECT, AN ECO-ACOUSTIC INVESTIGATION

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Abstract

Music for the Banal, the Obvious, the Everyday is an ongoing performance project that examines the specifics of site through deep listening and local materials; drawing on the performance tradition of Pauline Oliveros and R.Murray Shafer as well as work of repurposing instruments by John Cage, and found-object music traditions in Peru, and India. The process is two-fold; a period of listening and inspiration from a particular location; interpreting the sounding world via acoustic means with the sensibilities of a post-electronic environment. The second process is that of collecting the instrumentarium, constructing a playable environment which may consist of nature, waste, discarded junk, kitchen ware, and structural elements of buildings. These two elements come together in a spontaneous performance work that draws on years of study of the detailed innards of wind, traffic, insects etc. Music for the Banal, the Obvious, the Everyday contributes to our understanding of the field of acoustic anthropology and ecological art, cleansing our ears, and making listening an act of positive activism.

This paper will explore my personal performance process of working with found object sounds – both found and discarded objects, and nature - contextualised within a broader context to illuminate its connection within an historical continuum. I will first address my evolving working methodology, and then open it up to paralells in the field. Broadly speaking I will be positioning the work within the field of percussion, improvisation and contemporary experimental music practice, with an understanding of ethnomusicology and acoustic ecology.

There are two parts to my practice which sits broadly under the title Music for the Banal, the Obvious, the Everyday; both centred around the idea of expanding our capacity to listen – honing in on what we can hear. Hearing is an unconscious act, but to listen and cognise sound is an extremely active process, difficult in a world already saturated with so many layers of sound.

The first part of my practice is to learn to listen to my immediate environment, discerning layers of sound, the presence of sound, and listening to the effort taken to make a sound. This process takes place through sound diaries, meditation, deep listening. And preferably it takes place over hours, days and weeks in the same environment until I can hear the changing seasons, the days of the week, the times of day, the weather. Within this listening a few things have become clear:

It is virtually impossible to escape the ubiquitous sound of traffic as it permeates even the most rural settings as a drone, extreme bushland as a punctuated event, and the city as an unavoidable hum:

- The sound of wind is extraordinary as heard through every different tree (the clapping trees/poplars of Western Queensland are a favourite), through each architectural framework, and as it passes by ones own ears;
- The environment is not tentative about sound. A galah flying overhead is not self-conscious about the peaceful environment in which it squawks, nor is the tractor or the cow. Sounds can sooth, startle, obfuscate and seduce, just as in any musical practice.

The second part of my practice is to collect objects around the site of my intended performance. This can include discarded and wanted manmade objects (metals, glass, paper, plastic etc) or natural objects (twigs, wood, leaves, water etc). Because most objects are found on site, they are reflective of local vegetation, seasonal change, recycling habits, culinary interests, and general perspectives on clutter. Together they form my instrumentarium to investigate and perform upon: my sounding environment.

Using percussive techniques and manufactured factory made mallets these objects get hit, rubbed, dropped, shaken, scraped, or broken.

This work harkens back to an important chapter in the development of Western percussion – the sound finding days of the 1920s and 30s with composers William Russell (1993), John Cage, Lou Harrison, Henry Cowell using everyday objects as instruments; Russell called for a Jack Daniel's bottle, a suitcase; Cage (1941) asks for brake drums (no pitch specified, although the make of drums he used is known), tin cans gradated, a conch shell; Partch (2009) constructed instruments made from bamboo, brass shells, steel springs and gourds. This was a time when pitch was the result of what was hit. Modes were the result of the combination of objects hit, constantly reconstructing the harmonic language in not just every piece, but every different performance. This accidental ordering of pitch produces surprising results – it is always interesting, and always correct. The ear tunes to the sounding material, much as the ear tunes to ones sounding environment. Surprisingly incongruous sounds develop tensions and relationships.

Another trajectory of found sound comes from traditional music's from all parts of the globe where locally supplied objects are incorporated into the music; the Afro-Peruvian wooden box cajón, the cardboard box of Slim Dusty fame, the musical saw used in Finland, spoons from Ireland and Italy, the Indian ceramic bowls – Jaltarang, and the panzi dance from Sichuan province, China, where the plate and chopstick are the main musical feature. There is immediacy in people making music with what is available; the opposite of the refined nature of the violin or the oboe where technological construction is working in sympathy with a desired sound. With locally found objects the sonic outcome is idiosyncratic and open. It is always a question – what sound can I make with that? What music can I make with that?

My work with listening is an extension of that which has been articulated and explored by composers such as John Luther Adams (2009), Pauline Oliveros (2005), Annea Lockwood (2008), and environmental improvisers such as Lawrence English (2003) and Jim Denley (2007). There is an almost post-electronic perspective on my sound analysis; discerning objective qualities of sound– envelope, amplitude, frequency, spectral analysis, duration and the more subjective awareness of presence and effort in sound making. Once awareness of subtle transformations in sound has been achieved, this attention can be passed over to the collection of objects, and they become the site for sonic investigation.

Fundamental to this practice, is that each object contains within itself discrete musical properties and potentials. The work is made from exploring these potentials, giving voice to the sonic properties, altering their function from utilitarian to fundamentally musical. The wine bottle is not just a bottle, but a myriad of transforming sounds.

In the building of the instrumentarium, or meta-instrument, not only are the objects examined, but also their relationships are examined. A series of wine bottles form a pitch set and contain subtle timbral variation. When they are combined with a piece of roofing tile, the story transforms. The quality of clay versus glass is called into question, as is the relationship between a wine bottle and a roof. Therefore the larger scale work, Music for the Banal, the Obvious, the Everyday, is a kaleidoscopic probe of the potentials of all these objects, which together teach me (and potentially the listener) their relationships, stories and properties.

I choose to sonically interrogate my found objects in three different ways – all acoustic:

- Dropping. This process was first investigated in Practice (Tomlinson, 2000) in 2000, and then later taken to an extreme in Erik Griswold's hypnotic kinetic work Spill (Griswold, 2007). In Music for the Banal the act of dropping can include locally found seedpods, gravel, grass or purchased wheat, rice, lentils etc. In this manifestation the objects are constructed into a static installation, a prepared meta-object, and the dropping items cascade and collide into the construction. Here there is little control of the end point – the individual pathway of a grain of

rice – but the intention comes in the preparation of the installation. A further transformation of this occurs in relation to more recent ice sculptures, akin to the sculptures of Mineko Grimmer (Haskins, 2009), encouraging an "automated" process of sound intervention and listening which foregrounds notional silence.

- Hitting. The act of percussing on an object is central to this work, and possibly the most intentional sound-making device used in this practice. Years of training have revealed the subtleties and variations possible through transformations in technique, hitting position on the object, hitting position of the stick, dampening techniques among many others. These variations provide an assortment of sonic transformations that make the command such as "hit a snare drum forte" incomprehensible. Where do I hit it, with which part of the stick, do you want a high pitched sound, low pitched, resonant, non-resonant? The where of hitting, is perhaps the most comprehensive investigation in this work.

- Ropes. Erik Griswold began rope work with the well-known Strings Attached (Griswold, 1999) in 1999. This idea has been mutated in my work, tethering the ropes to a single point and playing them in the air with only the troughs of the sound waves coming into contact with the instruments now scattered on the floor. The resulting sound world is akin to wind chimes, only with a more timbrally diverse palette. The preparations of the floor – usually in zones or families of sound (ceramic, glass, metal, paper, leaves etc) – allows for a degree of timbral control in the sounding of the installation. But the intentional lack of specific control, which I refer to from a post-Cagean perspective as determined indeterminacy, is the central tension in this work. The individual icti, and the ordering of these individual icti are virtually impossible.

There is no doubt that this work challenges one of the central notions of Western Art Music – reproducibility. The artefact of score does not exist in this work, nor is the investigation elementally about improvisation. Or if it is about improvisation, it is certainly not free, but investigative of a specific question. And it also demands that we consider the where of music making. The impoverished sound world of so many clean concert halls will yield different music from the potential clutter of a school, or a gallery, or an outdoor space. Outback Australia will produce a different instrumentarium to the pastoral environment of Umbria in Italy. This is reflective, ephemeral work that exists only in its moment of activation, and retains some form of permanence through recordings, and photos. Eventually a larger collection of these works undertaken all over the world will build a larger, as yet invisible, narrative. But for now, the retuning of my ears, the immersion in environment, and acceptance of so many new pitch propositions is the immediate and endlessly varied narrative, and the forward propulsion for my constantly evolving engagement with understanding sound through my environment and vice versa.

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18. SOCIAL CAPITAL AND SEAFOOD: BALANCING INDUSTRY AND COMMUNITY LINKAGES

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Abstract

Small seafood producers make a significant contribution to the economic and social prosperity of many Queensland coastal communities. These contributions are enhanced through strong community relations, levels of interactions between fishers and their families, and relationships between different industry members, interest groups and regulators. This paper investigates the social capital within Queensland's East Coast Trawl Fishery (ECTF), and the implications for regional communities. The results suggest that despite the potential for doing so, social capital is not actively or purposefully created, utilised, maintained, or drawn upon within the focal fishery. A more collaborative approach to decision making is needed to gain the potential benefits from the extensive knowledge embedded within the industry. Recognition of the social value of the ECTF fishery derived through community cohesion, contribution, and diversity, is required for sustaining and balancing economic and social growth, whilst maintaining a healthy environment and viable industry.

Keywords: Social sustainability, fisheries management, social capital, social networks, community cohesion

Introduction

Australia's food system is complex and diverse. Numerous challenges are facing the food industry including changes in consumer preferences and consumption patterns, economic impacts, climate change, finite natural resources, lack of stakeholder co-operation and collaboration, resource management changes, and increasing compliance, production and fuel costs. As 15 per cent of Australian jobs are within the food industry, its importance to the Australian economy should not be underestimated (DAFF, 2012). In regional areas, food industries link communities to the land and sea with more than 90 per cent of food production related employment being located in rural and regional areas (DAFF, 2011). Furthermore, population growth will increase demand for quality, secure, healthy food with world food needs expecting to rise 77 per cent by 2050 (DAFF, 2012:2).

Within the global food system, fisheries and the harvesting of seafood are currently undergoing major restructuring driven by economic pressures as a result of globalisation and technological innovation. This, along with changing consumer demands and increased food quality and environmental regulations, places significant pressures on small food producers (Camarinha-Matos, Afsarmanesh & Boucher, 2010). Australian trawl fisheries continue to work towards environmental sustainability and provide significant socio-economic benefits to many coastal communities (DAFF, 2012). Fishery activities, including fishery management, involve businesses from throughout the supply chain, multi-level government agencies, environmental, recreational and community groups. The connections between these industry players create networks that can expedite or impede collective action that influence outcomes for the industry, fishery stakeholders and local communities. In many cases, the formations of collaborative networks are required to ensure a balanced and sustainable industry in a challenging and often uncertain future.

For regional communities, the survival of small food producers is a fundamental element for maintaining local economies and social cohesiveness. This paper focuses on a large coastal fishery, the East Coast Trawl Fishery (ECTF), and reports on the availability of social capital within the fishery and the implications for regional communities. It does so in recognition that economic viability and

community connectivity need to be in balance to sustain economic and social growth while also maintaining a healthy environment into the future.

Social Capital & Collaboration

Social capital refers to the bank of resources created from the interpersonal networks, associations, mutually beneficial interactions and relationships between people that facilitate co-ordination and co-operation (Putnam, 2000). Furthermore, social capital can aid our understanding of social sustainability. As a resource, social capital can be built up and drawn upon, is linked to economic and community development and to the long term health of communities (people, places and profits). Social capital, unlike economic capital, is only converted into fiscal gain if there is uptake and collaboration (Bourdieu, 1985). The OECD (2001) suggests that social capital is indirectly produced by societal investments of time and effort that can give rise to collective action.

Studies indicate that collective action between small and medium sized food system enterprises can improve performance and enhance their contribution to local areas (Lamprinopoulou, Tregear & Ness, 2006). Collaborative action can bring diverse individuals with different experiences and perspectives together to generate new and adaptive ideas and actions for solving difficult industry challenges (Agranoff, 2003). Community bonds are critical for sustainable resource management and governance (Pretty, 2003). Effective fishery management outcomes are dependent on strong community relations, levels of interactions between fishers and their families, and relationships between different fishing and interest groups (Grafton, 2005; Sekhar, 2007). Furthermore, high levels of trust and co-operative capacity within fishing industries are required for effective and efficient resource management (Gilmour, Dwyer & Day, 2011). Communities involved in collective decision-making based on trust are better able to settle conflicts via informal mechanisms (Sekhar, 2007).

To further understand social capital it is useful to look at the three key types: bonding, bridging and linking. Bonding social capital includes strong connections within, and often between, family, friends and like-minded individuals (Grafton, 2005). Putnam (2000) defined bonding social capital as inward looking, homogenous networks with strong ties that are characterised by ‘thick trust’ which facilitates transparent decision making and co-operation in the collective interest (Bain & Hicks, 1998; Krishna & Shrader, 1999; Patulny & Svendsen, 2007). Bridging social capital views outward heterogeneous connections across diverse social cleavages as potential sources of novel advantages (Woolcock & Narayan, 2000), and is characterised by ‘thin trust’ (Putnam, 2000). Linking social capital refers to links across disparate groups at different hierarchical levels that provide access to those in positions of power and those who are instrumental in decision making (Woolcock & Narayan, 2000), that is, links to power and influence (Edwards, 2004).

Social capital can be extended beyond direct industry opportunities through co-operative behaviour which can generate indirect community benefits, for example, civic engagement. Communities with diverse, active citizen participation may be more resilient in times of adversity and change. These networks of individuals and groups can have a causal effect for building social capital (Grafton, 2005). As asserted by Putnam et al. (1993:36) “working together is easier in a community blessed with a substantial stock of social capital”. Field (2003:1) states “relationships matter” and these relationships create social networks that are in and of themselves, a valuable asset.

Social networks are formed consciously or unconsciously relative to business, cultural, social, historical interests, personal and professional similarities and geographic proximity (Adamic & Adar, 2005). Strong links between members of social networks, can facilitate a willingness to comply with collective rules, help in the transmission of information and knowledge, and increase the opportunities for social interactions that promote altruistic behaviour (Sekhar, 2007). Gaining an understanding of the social networks associated with food systems provides insight into social capital further facilitating understanding of how to achieve balance.

Case study

Australian fisheries have undergone significant management changes over the past two decades and are recognised as world leaders in product quality and environmental management. The East Coast Trawl Fishery (ECTF) is a dynamic network of businesses and small independent fishers who harvest, process, market and sell high quality seafood (QSIA, 2012). This important Australian fishery is spread over a broad geographical area from the Torres Strait to the Queensland – New South Wales border. Unlike those that are more geographically compact, the ECTF is not a single fishery but a network of numerous smaller fisheries dispersed along the coastline. The fishery is a vital contributor to the State's economy being one of Australia's largest in terms of volume with an annual retail value of approximately AUD$100million (QSIA, 2012). Of the 21 species retained in the fishery, the bulk of the 6,165 tonne of product consists of prawns (4,969 t) (MBSIA et al., 2010).

Research into the economic impacts of fishing activities has been variously conducted. In this, as in other industries, environment impact assessments have increased in importance, prevalence and number. Social sustainability and social impacts have been the last of the three key pillars of sustainability (economic, social and environmental) to be investigated, but are now also coming into increasing focus. Ecosystem-based fisheries management considers the impact fisheries have on all components of sustainability including communities (DEEDI, 2009). This paper concentrates on the social component and one of the ECTF key stakeholder groups, the commercial prawn fishers. This group is heavily impacted by external forces and it is struggling to achieve a balance as their work/ life nexus is inextricably linked.

Methodology

Semi-structured questionnaires were used within a qualitative based, in-depth interview strategy to collect, map and analyse data from participating fishers within the ECTF. Network research was employed to examine the structural network properties, as the relationships and position of individual actors within the network have consequences for the individual and the fishery network as a whole (Knoke & Kuklinkski, 1982). The application of network analysis to further understand the social capital of the fishery is relevant for gaining useful information about how inter-organisational relationships in different regions are structured (Scott, Cooper & Baggio, 2008). The results provide insight into the three key types of social capital: bonding, bridging and linking.

Results

Respondent Characteristics

Responses were provided by 66 individual commercial prawn fishing operators within the ECTF. Overall, respondents were predominantly male (92%), with an average age of 52 years. Seventy-eight per cent were married with various education levels including primary school (8%), year 8 or 9 (24%), year 10 (44%), year 12 (6%), and tertiary studies (18%). Fishery-related activities accounted for an average of 86 per cent of the total household income. Respondents were geographically located throughout the fishery between Cairns and Southport; specifically, the ports of Cairns, Innisfail, Townsville, Mackay, Bundaberg, Urangan, Mooloolaba, Moreton Bay and Southport.

Bonding Social Capital

A number of measures were used to assess the levels of bonding social capital within the fishery. Bonding social capital relates to a sense of belonging and trust and a willingness to work together and involves the close links between like-minded individuals, family and friends (Woolcock, 2001). This type of capital can be examined by assessing how long respondents have been involved in fishing including generational history, the employment of family, how many friends and family are involved in the fishing industry, the social support from others within the industry, and the role family and

friends play as sources of fishery-related information.

Industry longevity and generational history is extensive within the ECTF. There is also a large amount of accumulated skill and knowledge embedded within individuals working in the fishery. The average length of time respondents have worked in prawn trawl fishing is 31 years, with 82 per cent of respondents having worked in the industry for more than 20 years. Over half of the respondents (53%) indicated they were 2nd, 3rd, or 4th generation fishers, though it was commonly reported that the family orientation and intergenerational nature of the industry is changing.

When asked whether respondents would encourage young people to enter prawn trawl fishing, responses were mixed. The majority stated "*No*" (68%), with comments suggesting that the reason for this was young people can receive "*better money elsewhere* [in the mines]", the seasonal nature of the industry "*is hard*", and that there is "*no future*" and "*no security*" in the industry. Representative responses included comments stating: "*I would love to pass it onto kids but facts are that unless there is change, the industry may not be there*", and "*I wouldn't encourage my son to do it, but if someone came along and wanted to jump on the boat, sure*." A number of responses followed similar lines, suggesting that "*there is not enough support for someone new to come into the fishery; but new people are definitely needed*". In contrast, 30 per cent responded "*Yes*", they would encourage young people to enter the prawn trawl fishing industry, revealing that whilst it was hard work, "*there's money to be made*" and fishing can "*give you a good lifestyle*".

Respondents were asked about the number and type of family members employed within their fishing businesses. Many indicated they employed family members including siblings, children, parents and spouses, with 83 per cent of business owners employing between one and four family members. Whilst the fishery is male dominated, these fishery members are time poor and commonly rely on female partners to undertake crucial administrative and marketing roles. Sixty-seven per cent of the respondents cited that their partners supported their business in various capacities, often providing the only link between fishers and the wider community, by taking an active role in relevant industry activities and/or promoting the industry in their local areas. Furthermore, economic pressures, including increasing fuel prices and regulatory compliance costs, have meant that many fishers are spending longer at sea. This has social ramifications including pressures on the family unit, business failures, and mental and physical health issues.

Respondents were asked whether they were satisfied with the support and guidance they received from others in the industry. Nearly half were either satisfied (35%) or very satisfied (14%) on this measure, whilst 27 per cent were neutral. Eighteen per cent were either dissatisfied (15%) or very dissatisfied (3%) with the support and guidance from others. According to some respondents, the social support was strong: "*it's a close knit community; everyone does try to help each other out*", or an expected norm: "*you would go out of your way to help each other out, but that is part and parcel of being fishermen*". Whilst other responses were mixed indicating the complexity of these relationships, for example, "*most trawl operators are individuals and wouldn't want to take advice, they're not your friends they're your competition*".

Respondents were asked about their friends who work in the industry. Thirty-nine per cent indicated that '*most*' or '*almost all*' of their friends worked in the fishing industry, whilst 21 per cent indicated '*about half*', 33 per cent '*few*' or '*very few*', and 7 per cent indicated that '*none'* of their friends worked in fishing. Therefore, the majority of fishers (60%) had 50 per cent or more of their friends working within the fishing industry. Respondents were also asked to nominate up to seven individuals that they most frequently contact for information concerning the fishery. Fellow fishers were the most frequently nominated source, with 80 per cent of respondents naming at least one. Despite the support they receive from family, only 15 per cent nominated family as a key source of information.

Bonding results when strong intra-community connections give people social support, a sense of identity and a common purpose. The variables presented above provide an indication of the bonded social capital that may exist in the fishery. From port to port, there was evidence of the connections between small homogenous groups of fishers, their families and friends. However, the regional nature

of most ports and the long periods spent at sea, may limit the social support advantages available from strong bonded social capital. Furthermore, fishers stated they relied mostly on themselves or their immediate family. When asked from whom they learned the skills required for prawn trawl fishing, the majority of respondents stated they were self-taught (89%) supporting the suggestion of self-reliance. Respondents also stated they learned about prawn trawl fishing from family (62%) and other fishers (62%). In addition, trust, a fundamental component of social capital, was said to be low between individuals and other community stakeholder groups, and connections between fishers and the broader community were frequently noted as lacking.

Bridging Social Capital

Bridging social capital is created via the links between different types of fishers, different individuals and groups throughout the supply chain, and community groups. Bridging social capital was assessed by examining the number and diversity of the groups within the fishery network, and the type of interaction and memberships in community and industry groups, associations and organisations. In addition, to further assess the relationships between the fishers and their local community, the respondents were asked to comment on community perceptions of the prawn trawl industry.

In terms of community connection, respondents were asked to report on membership, involvement and interactions with local community groups and industry organisations. It was suggested they had long term connections to their communities. Respondents have lived in their local communities for an average of 30 years and 81 per cent expect to still be living there five years from now. Twenty-four per cent of respondents reported holding membership within a variety of community groups and organisations including sporting clubs and social groups, school committees, boating clubs, local RSLs, Scouts, church groups, Chamber of Commerce, and political parties. However, only three respondents said they held positions of responsibility within these groups and organisations. Most respondents reported having little or no active involvement within these groups and organisations and time restraints were cited as the main reason. Further, almost two-thirds (62%) of respondents were not currently members of any community groups or organisations.

With regards to industry-related organisations, 64 per cent of those interviewed held a current membership. However, many stated that they "*never*" or "*rarely*" interacted with these organisations. Less than half of the fishers (46%) nominated one or more representatives of industry organisations as people they would most frequently contact for information concerning the fishery. These results suggest bridging social capital is limited. Bridging capital between those working in the industry and the organisations that represent them may exist when looking at the number of respondents holding membership, but is limited due to the low levels of involvement and interaction.

Respondents specified the perception held by the general community regarding commercial fishing (prawn) as mixed, with 48 per cent of respondents believing their local community were positive towards commercial fishing while 32 per cent believed their local community held negative perceptions. Open ended responses were equally mixed with some stating "*people* [the general community] *are more educated*" suggesting a positive response but conversely that "*due to lack of knowledge about the industry*" a negative perception of the commercial trawl fishing has been created. Some respondents suggest they and others have worked hard to establish community connections in order to improve perceptions. For example, one respondent noted, "*we have put 12 years into educating our local community through the seafood festival*".

A broader perception of Queensland residents were examined and the results were reversed with 28 per cent of respondents believing that Queenslander's were positive towards commercial fishing while 48 per cent believed perceptions to be negative. A number of respondents suggested that it differs from region to region, and is dependent on a variety of other factors.

It was commonly acknowledged that whilst community education is required, time and financial pressures have resulted in fewer opportunities for civic engagement. Many respondents discussed their contributions to community groups, schools and sporting clubs, but indicated that they were no longer

able to do so or did so less often, due to financial pressures and more time spent at sea, stating that, "o*nce upon a time we used to be heavily involved in the community, sponsoring football teams, donating to raffles and the like. No time or money for that now*."

Overall, the existence of and potential for, bridging capital is again evident. However, similarly to bonding social capital, bridging capital is limited, with links only sporadically created and poorly maintained.

Linking Connections

Finally, linking social capital reaches across networks to connect disparate groups outside of, but related to, the industry that are in a position to exert power and influence over fishery related decision making. In this instance, links of importance include government departments, and other community groups, including environmental and other fishing groups who contribute to fishery-related decisions.

In regards to important government decisions affecting the fishery, the majority of respondents said that the dissemination of information was undertaken and meetings were held. However, it was repeatedly stated that decision making was not considered to be a truly collaborative process. Within this fishery, only three per cent of respondents stated they were able to contribute to decisions made about the fishery, with 24 per cent indicating they believed they could '*mostly*' contribute. The majority, 73 per cent, felt they had very little or no power to contribute to decisions made regarding the fishery. This correlates with levels of respondent satisfaction regarding the amount of control they have over decisions affecting how fishers undertake their fishing activities, with 50 per cent revealing a level of dissatisfaction (31 per cent were '*very dissatisfied'*, and 19 per cent *'somewhat dissatisfied'*). According to one respondent, "*we* [commercial fishers] *catch the majority of the domestic seafood consumed by Australians, yet we have almost no say in decision making that directly affects our businesses.*" Only 15 per cent reported being satisfied with the amount of control over these types of decisions. Further, respondents were asked to report on their satisfaction with the decisions made by government on fishing operations in the ECTF. Forty-three per cent reporting they were '*very dissatisfied'* and 22 per cent reporting being *'somewhat dissatisfied*'. In total, only five per cent reported satisfaction on this variable.

As a source of information concerning the fishery, government representatives were only nominated by 19 per cent of respondents. Further, of the seven sources respondents said they frequently utilised, other community stakeholder representatives were only nominated by four per cent of respondents. This, along with the variables above, suggests a disconnect between those working in the fishery and those in positions of power and influence, signifying that linking social capital is quite limited, and poorly utilised, within the ECTF.

Discussion & Conclusions

Small and medium sized food producers make a significant contribution to the economic prosperity of many regions. Australian trawl fisheries employ strategies and tools for reducing environmental impacts while providing significant socio-economic benefits to many coastal ports (DAFF, 2012). Harnessing these benefits is reliant on strong community relations, levels of interactions between fishers and their families, and relationships between different government, fishing and interest groups (Grafton, 2005; Sekhar, 2007). The greater the social cohesiveness, and the more advanced the level of collaboration, the more effective is the establishment, strength and utility of social capital. To achieve this, a balance between the three types of social capital is needed.

Bonding social capital appears to be the most prevalent form of social capital within the ECTF. However, it exists in smaller pockets rather than including larger, more connected grouping suggesting an influence due to geographic location with closer ties existing between those residing and fishing in similar locations. However, some respondents worked in different locations throughout the year, and/or spend long periods at sea, separated from family and friends. This reduces the opportunity to

develop relationships within their local communities. Whilst bonding social capital is necessary in order to add value to local communities, according to Putnam (2000), bridging social capital is also required.

There exists some diversity of membership within community and industry groups which can facilitate bridging social capital within the ECTF. Diversity of intercommunity ties can place people and industries in a stronger position to confront problems and take advantage of economic opportunities. However, active involvement and engagement is required to strengthen this capital and sustain it over time. The ECTF is fragmented by geography, fish species, boat and/or license type, site specific issues and available resources. This has created sub-fisheries in various locations. Instead of benefiting from the multiplier effect of access to resources, support, and ideas to generate innovation for a competitive, resilient industry, the fishery is being segmented into smaller and smaller groups. These sub-groupings are further sub-dividing, reducing the possible opportunities for the individual, the fishery and the wider industry. This insulation provides pockets, effectively confining people to their functional areas, and in some cases results in the social isolation of individuals from their communities.

An evolving view suggests that supply chains are strengthened through enhancing informal relationships and building social capital and the use of semi-formal co-operative groups that cut across the existing industry structure can facilitate this (McGrath & Sparks, 2005). It should be noted that co-operation features loose relationships, autonomous goals and information sharing (Keast, Brown & Mandell, 2007), all of which were evident in the ECTF. Co-operation is an important process and has resulted in the achievement of some positive outcomes for stakeholder groups. However, frequently the fishery utilises repeated, independent cycles of co-operation that only occasionally, and in an unsustained manner, progress to stronger collaborative relationships (Keast, Brown & Mandell, 2007). Collaboration around a common purpose can unite individuals but frequently in the ECTF, it is a few individuals who create and pursue links between stakeholders and actively work for the common good. Respondents taking on these roles highlighted they were, after a time, "*burned out*", "*frustrated*" and "*despondent*" at the lack of support and follow through from others. This is not confined to fishers, it was also been identified by some who have worked throughout the supply chain and in industry-related organisations.

Sekhar (2007:509) suggests that "bonding social capital within local fishing groups and bridging social capital between various fishing groups is responsible for upholding community interests over individual gains" and creates opportunities for economic gain. Therefore, these are important forms of social capital for fisheries. However, we would suggest that linking social capital is of particular importance to this fishery due to the impact of managerial decisions on fishing activities, now and in the future. Whilst connections within and between local fishing communities and the wider fishery are essential, a lack of co-operation with groups and individuals who influence decision making can impede successful, long-term outcomes for the industry. In turn, outcomes leading to increased pressure on industry participants may further constrain the ability for industry players to engage with their local communities.

Stakeholder interaction and a collaborative approach toward decision-making are required to reconcile the often conflicting interests between groups who utilise the fishery. A lack of collaboration was commonly reported in the fishery, a problem common to fisheries worldwide (Hilborn, 2007). Formalised arrangements within fisheries, such as co-management can help to build trust. However, an overreliance on institutional arrangements can lead to distrust, particularly when fisheries are faced with new challenges, and institutional arrangements fail to adapt to these changes (de Vos & van Tatenhove, 2011). Distrust is clearly evident within the ECTF, highlighting the need for a greater level of both co-operation between stakeholder groups and effective consultation and involvement of those working in the industry in decision making.

Following the recommendations of Grafton (2005), to achieve a more balanced approach for the ECTF, regulators should endeavour to systematically incorporate the embedded knowledge from within the fishery concerning the state of the resource; nurture decision-making bodies or advisory boards, ensuring equitable representation of stakeholders; and, develop effective and impartial

processes for dispute and conflict resolution. As collaborative decision making should not focus on any single individual or group, stakeholders, despite their varying agendas, should actively and purposefully ascertain a course of action that is best for the collective. This is a challenging approach, but in fishery management elsewhere has been shown to be effective (Gutiérrez, Hilborn & Defeo, 2011).

Despite the potential for doing so, social capital was not actively or purposefully created, utilised, maintained or drawn upon within the ECTF. Results reveal respondents would prefer to act independently rather than as a cohesive group. When collaboration occurred, links were created for reasons of convenience or to accomplish a specific task, but were not necessarily maintained. Recognition of the value of the ECTF fishery, not only the economic contribution, but also the social contribution through community cohesion and diversity, is needed as a first step toward changing the status quo. A balance between the different types of social capital is required to sustain economic and social growth while also maintaining a healthy industry and physical environment into the future.

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19. USING BIOSPHERE RESERVE AS AN INTEGRATED PLANNING AND MANAGEMENT TOOL: A CASE STUDY IN KIEN GIANG VIETNAM

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Abstract

Established in 2006, Kien Giang Biosphere Reserve (KGBR) boasts a very high biodiversity and typical forest ecosystems. The challenge for the Reserve and Provincial managers is to balance economic development with conservation. Eighty per cent of the land area is less than one meter above sea level and therefore under threat from climate change, mainly sea level rise and storm influence. A Biosphere Reserve Management Board (BRMB) was set up by the Provincial People's Committee (PPC) to advise provincial leaders on how to solve complex issues using integrated, cross sectoral management decisions. The use of cross-sectoral planning is a new concept being encouraged by the Government of Vietnam. A comprehensive capacity building program for key members of the BRMB has been underway for the past four years, with technical assistance from the "Conservation and Development of the Kien Giang Biosphere Reserve Project", funded by AusAID and implemented by GIZ. This program has led to the implementation of several new and innovative management approaches that were developed through consultation with a wide range of stakeholders in KGBR. For example, (1) Provincial Integrated Coastal Management Plan for Climate Change Adaptation and Mitigation; and (2) Management plan to harmonize and develop environmental protection for the unique, cultural and historical values of Dong Ho Lake.

Keywords: Vietnam, Biosphere Reserve Management, Cross-sectoral activity

Introduction

Kien Giang is a coastal province in the western part of the Mekong Delta. It is situated from 9^0 23'50''to 10^0 32'30'' north and from 104^0 40'00'' to 105^0 32'40'' east. The province shares a border with Cambodia in the north, An Giang, Can Tho and Hau Giang provinces in the east and southeast, Ca Mau provinces in the south and Thailand gulf in the southwest. The Kien Giang Biosphere Reserve (KGBR) was established in 2006 and encompasses much of the 200km coast line and adjacent marine areas of the Province as well as U Minh Thuong and Phu Quoc National Parks. The Biosphere Reserve (BR) covers 1,118,105ha of Kien Giang Province, with a 36,935ha core zone, 172,578ha as buffer zone, and 978,591ha transition zone. The BR seeks to foster the conservation of 22 habitats within tropical rainforests, limestone and karst forests, swamps, melaleuca (*M. cajuputi*) forests, mangrove forests, sea grass beds, coral reefs, coastal wetlands, and seasonally flooded grasslands (see Figure 1 for a map of the reserve).

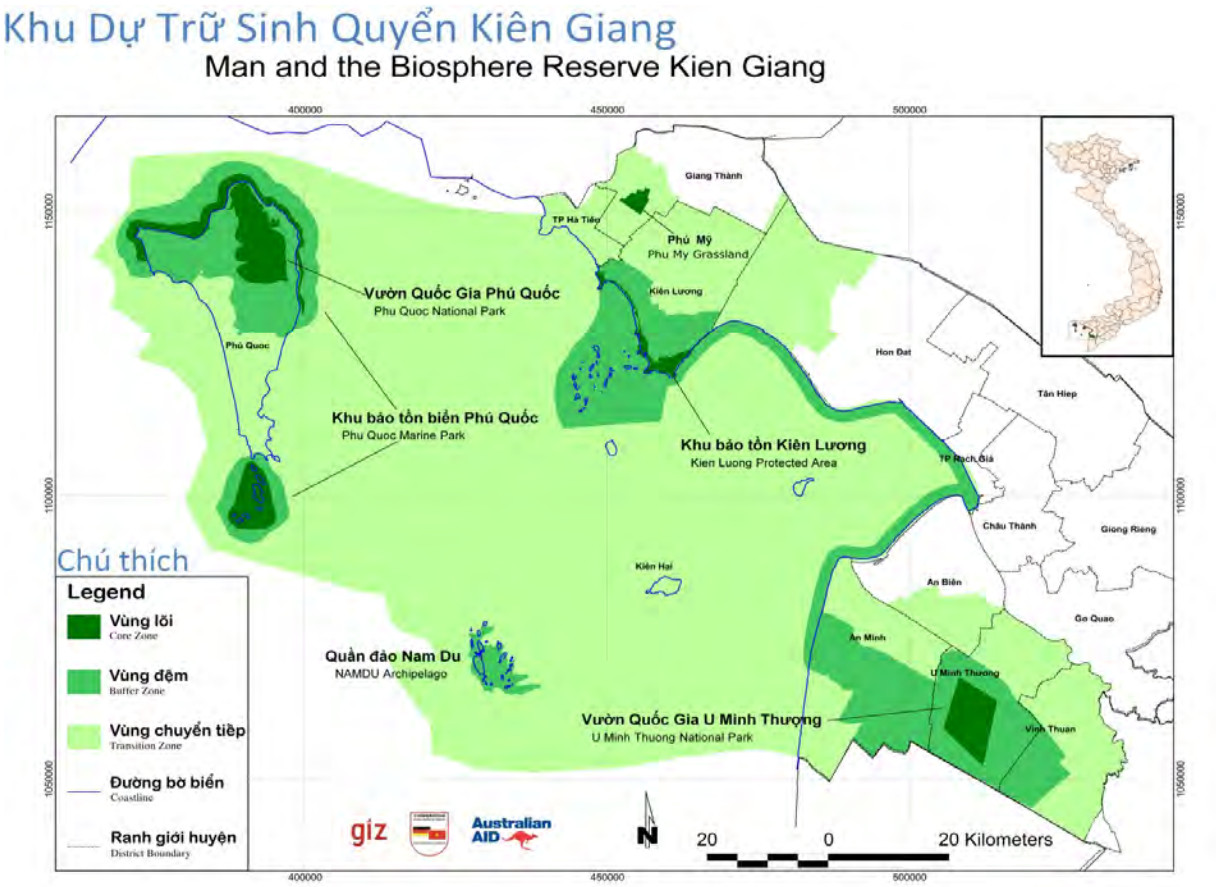

Figure 2. Kien Giang Biosphere Reserve

The KGBR has significant biodiversity with about 1,500 vascular plants, 77 mammal species, 222 bird species, and 107 reptile and amphibian species (Kien Giang People Committee, & UNESCO Vietnam, 2005). Twenty species have been identified as having special conservation priority including the Round leaf Cycad (*Cycas litoralis)*; Hairy-nosed Otter (*Lutra sumatrana*), Jungle Cat (*Felischaus*), Fishing Cat (*Prionailurus viverrinus)*, Large-spotted Civet (*Viverra megaspila)*, Indochinese Silver Langur (*Trachypithecus germaini)*, Lylei's Fruit Bat (*Pteropus lylei)*, Large Flying Fox (*Pteropus vampyrus)*; Sarus Crane (*Grus antigone)*, Indian Darter (*Anhinga melanogaster)*, Lesser Adjutant (*Leptoptilos javanicus)*, Great Hornbill (*Buceros bicornis)*; Reticulated Python (*Python reticulatus)*, King Cobra (*Ophiophagus hannah)*, Yellow-headed Temple Turtle (*Heosemys annandalii*), Malayan Box Turtle (*Cuora amboinensis)*, Snail-eating Turtle (*Malayemys subtrijuga)*, Asiatic Softshell Turtle (*Amyda cartilaginea)*, Green Sea Turtle (*Chelonia mydas)* and Hawksbill Sea Turtle (*Eresmochelys imbricata)*.

Four forest types and plant communities have been identified as having special priority for conservation.

- Dwarf forest on sand hills in Phu Quoc Island
- Near mono-specific stand of Red-flowered Black mangrove (*Lumnitzera littoraea*) in the Rach Tram estuary of Phu Quoc Island. The trees are very large, 10 - 15 m tall with diameter 30 - 60 cm and up to 1 m. The species is listed as vulnerable in the Viet Nam Red Book of Endangered Species
- Melaleuca forest on peat land in U Minh Thuong National Park.
- Coastal mangrove forest.

- Coral reefs: 700 ha of coral with 87 species, nearly half are hard corals making up to 24% of the coral area. The corals occupy up to 40% of the reef areas. There are 12,000 ha of sea grass beds (10 species) which support rare and endangered turtles and dugong. These are very important ecosystems for biodiversity but are also very important for tourism particularly on Phu Quoc Island.

Management challenges

The overall challenge for the BRMB is to balance sustainable economic development with conservation of the environment and particularly its unique biodiversity. Some of the key challenges facing the BRMB are:

- Lack of awareness: The BR concept is new to the provincial staff and local communities. Environmental awareness of the staff and local people is limited.
- Climate change and sea level rise: The studies undertaken by MRC (2011); (ADB, 2011), and the Ministry of Natural Resources and Environment (MONRE) show that Kien Giang is one of two provinces most vulnerable to Climate Change and sea water rise in the Mekong delta. Most of the main land area in the province is a flat plain with an average elevation of 0.6 m-1.5 m above sea water level. If the sea water rises by 1 m, it is projected that approximately 75 % of the Kien Giang main land will be inundated by 2100 (MONRE, 2012). As a result, large areas of crop-land, melaleuca, mangrove forest and other seasonally inundated wetlands will be affected.
- Change in land use: Current development and livelihood activities that support the provinces high economic growth expectations have resulted in a large area of forest being converted for infrastructural development and agricultural production. This leads to negative impacts on both terrestrial and wetland ecosystems.
- High population: A large population (354,000 people) lives in the BR (Kien Giang People Committee, & UNESCO Vietnam, 2005) and these people rely on agriculture and aquaculture (fish, shrimp, crabs, clams) and the forest resources. Local incomes are low and illegal extraction often creates negative impacts on the biodiversity and resources in the Biosphere Reserve.
- Lack of integrated planning: The traditional approach of sectoral planning and management has led to the fragmentation and the degradation of important natural resources, particularly the protected coastal mangrove forest. As a result, the unique buffer vegetation along the coast has poor capacity for resilience and a limited ability to mitigate the effects of increasing surge storms and sea water levels.
- Lack of law enforcement: Although there are appropriate laws, law enforcement is not well implemented. This has allowed the continuation of illegal wildlife trading, forest fires, deforestation, pollution from industrial development, tourism activities, land clearing and digging of canals for farming (Dang, 2009).

The Biosphere Reserve Management Board and activities

On June 21st, 2010, the Kien Giang Peoples Committee (PPC) enacted decision number 1335/QD-UBND to set up a Biosphere Reserve Management Board (BRMB) and Steering Committee following the model of the GIZ Project. The board is composed of representatives from: the Provincial People's Committee (Chair of the management Board), Department of Science and Technology [DOST] as Vice and standing chair of the Board, Department of Agriculture and Rural Development (DARD), Department of Natural Resources and Environment (DONRE), Department of Finance (DOF), Department of Planning and Investment (DPI), Department of Culture, Sport and Tourism, National Parks, Forest Protection Management Boards, District Leaders, mass media and civil social organizations. This management system allows cross-sectoral integrated planning on adaptation for climate change, conservation, and sustainable development for local communities, scientific research, education and training.

Study tours and attendance at conferences have proved to be two effective activities contributing to the theme of awareness raising about the BR management for provincial leaders. After setting up BRMB, and with support from GIZ project, several study tours were organized to visit Noosa Biosphere Reserve (Australia); Wadden Sea and Hallig Islands of Schleswig-Holstein BR (Germany); Rannong BR (Thai Land) and Cat Ba BR (Vietnam). The study tours provided provincial leaders with opportunities to learn from the experience of other biosphere reserves and facilitated opportunities for networking, and the exchange and sharing of information and management experience across the BR system nationally and internationally. Best management practice identified from the study tours and conferences were reported to the Chairman of PPC and recommended for adaption and implementation in the Kien Giang BR. Some examples include (1) drawing on Noosa's management experience in collaboration with university and research institutes to bring domestic and international students to study the BR; and (2) Using the brand name of the biosphere reserve (for enterprises) to boost green development and contribute to biodiversity conservation as the model of Cat Ba Biosphere Reserve (Vietnam).

The Kien Giang BRMB is now able to apply an integrated approach to planning and management of its natural resources, particularly in areas with conflicts and overlapping of management roles that involve many agencies. Some examples of planning activities follow.

Integrated coastal management plan

Kien Giang Province has 205 km of coastline and it is estimated that at least one third (33 %) of this coastline is being badly eroded (Duke, Wilson, Mackenzie, Nguyen, & Puller, 2010). This shoreline has more than 5,000 ha of mangrove protection forests, forming a thin green line of salt-tolerant vegetation that buffers and protects valuable farming lands from rising seas and storm damage. This tacit coastal defense is threatened by development activities, illegal tree cutting and global climate change, as predicted rises in sea levels take effect. A great number of government agencies are currently responsible for managing different aspects of this area, such as:

- Forestry section; forest protection management boards (DARD) manages mangrove forests
- Fishery section (DARD); manages fishing and fish farming activities
- Irrigation section (DARD); manages dykes and water drainage systems (canal, sluice gates, dams and dykes)
- Department of the Natural Resource and Environment (DONRE); manages in-shore and off-shore areas
- Local authorities; manage livelihood and economic development.

The sustainable management of coastal areas under the threat of climate change cannot be left to the standard sectoral planning and management approach of the government. This approach is not effective due to the lack of collaboration among agencies. The PPC understands the need for an integrated, multi-sectoral coastal management plan for socio-economic development and natural resource management and has requested assistance from the GIZ project and the BRMB to develop a management plan. An evidence based plan was developed with consultation from a wide range of stakeholders. Collectively, the management plan contributes to a range of provincial and national government policies:

- Decree No: 25/2009/NĐ-CP of the Government on Integrated Management of Natural Resources, Environmental Protection of Sea and Islands;
- Decision No 172/2007/QĐ-TTG approved the National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020;
- Decision No 158/2008/QĐ-TTG of the Prime Minister on approval of the National Target Program to Respond to Climate Change;
- Decision 405/KTN of the Prime Minister approved Master Plan for Mangrove Management and Protection in Vietnam (period 2008-2015);

- Decision 667/QD-TTG in 2009 of the Prime Minister approved Program to Strengthen and Upgrade Sea Dyke System from Quang Ngai to Kien Giang;
- Decision 25/2011/QD-UBND of the Kien Giang PPC on Regulation for Mangrove Management and Development in Kien Province and the Provincial Mangrove Rehabilitation Plan for 2011-2020 period.

Main steps used in the development of the integrated coastal management plan in the BR:

1- Mangrove and Coastal condition assessment using the: Video Shoreline Assessment technique that was developed by the University of Queensland (Duke, Wilson, Mackenzie, Nguyen, & Puller, 2010).
2- A draft management plan was developed based on the coastal assessment in combination with reports from MRC (2010) and ADB (2011). The plan adapts and uses the criteria of the coastal hazard adaptation strategy approach (Standards Australia/Standards New Zealand, 2009) and the guiding principles developed by the State Government of Queensland, Australia (Department of Environment and Resource Management [DERM], 2012).
3- A consultation workshop was held and chaired by the chair of BRMB (who is also Vice chairman of PPC); members of the BRMB (leaders of DOST, DARD, DONRE, DPI, DOF, Forest Protection sub Department, Forest Protection Management Board); Irrigation sub department (DARD), Sub Department of sea and island (DONRE), Women's Unions, Farmer's Association, leaders of coastal districts and communes and GIZ project staff. This workshop provided an opportunity for discussion and the sharing of information among decision makers, planning agencies, local authorities and local people.
4- The final management plan was upgraded to reflect the conclusions of the consultation workshop. The plan has now been endorsed by the BRMB and submitted to PPC. PPC has submitted the plan to relevant ministries (MARD, MONRE, MPI, The Standing office of the support program to response to Climate change - SPRCC) and donors are currently discussing funding options with the PPC.

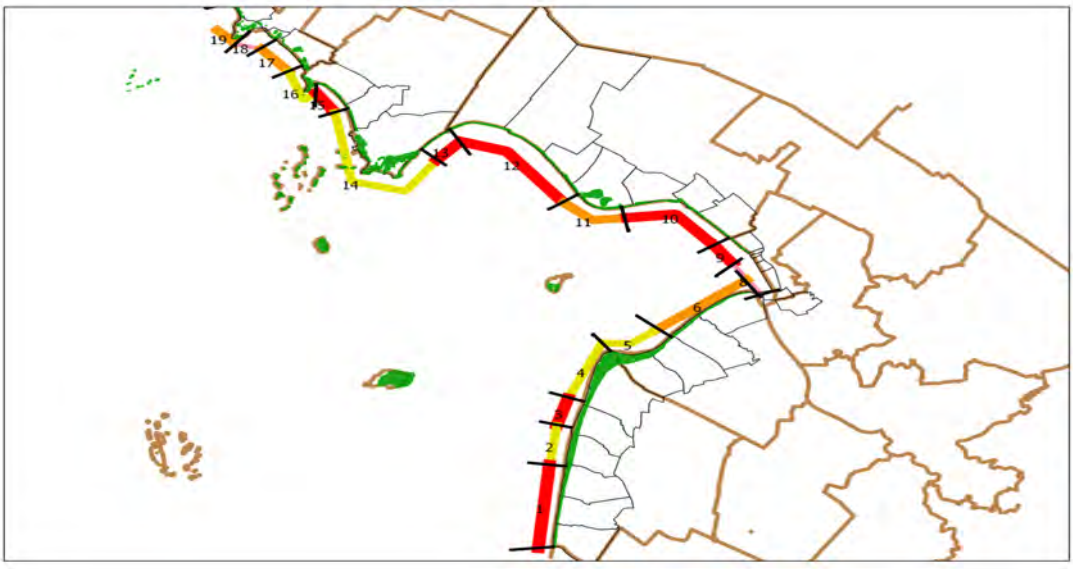

Figure 3. Integrated Coastal Management for Climate Change: Plan for Erosion Management, Mangrove Restoration and Coastal Livelihood for Kien Giang Province

Integrated planning for conservation and development of the Dong Ho Lake

Dong Ho is an estuarine lake with a north-south length of around 4.6 km and east-west around 3.5km (Chuan, 2011,Tuan & Chuan, 2011), adjacent to Ha Tien town, close to the Vietnam-Cambodian border. The focal area is 1,384 ha, of which about 903 ha is water, 250 ha is natural vegetation, including nypa palm (*Nypa fruticans*), 29 ha is used for gardens and 171ha for aquaculture (Huynh, 2011).

Figure 4. Large-scale summary of the main inputs and influences to Dong Ho Lake

(Sources: Johnstone, 2012)

Dong Ho lake is significant in Kien Giang Province because of its ecological character, its aesthetic qualities, and its historical, cultural and socio-economic links to the local community and Vietnam. It has provided fish, crabs and clams for residents and inspired many by its beauty, as expressed in the poetic and artistic record. However, the sustainability of the lake is at risk, along with its ability to provide the ecosystem services that the current generation need for their livelihood, and its ability to bring socio-economic benefits to future generations. The lake is subject to a variety of environmentally degrading processes, including infrastructure development, high rates of sedimentation, wastewater pollution, and intensive resource extraction. It is also highly vulnerable to the impacts of rising sea levels and altered floodwater regimes.

In response to the rapidly emerging concerns for the future of the lake the PPC, with support of BRMB and GIZ started to develop a plan that aims to guide sustainable development and conservation of the lake and its surrounds.

In early 2009, the Kien Giang People's Committee assigned the task of coordinating the adjustment of the master plan for Dong Ho to the Department of Agriculture and Rural Development and Ha Tien town. The resulting proposal used the sectoral approach (fishery development) which was found to be unacceptable by PPC.

In 2011, at the request of PPC and the BRMB, the GIZ project agreed to provide support to develop a master plan for Dong Ho that uses the multi-sectoral planning approach and aims to achieve the objectives of sustainable conservation, restoration and development, including protection of its historical and cultural values. An international conference was organized by BRMB with the participation of over 200 international, national experts, governmental staff, provincial leaders, industry and local people to discuss the future planning and management issues for the lake. The final conclusions of the workshop were: (1) Dong Ho Lake will be maintained as a brackish water body; its ecosystem, biodiversity, culture, education and scientific values will be preserved as well as its aquatic resources; and (2) The plan will have a long term vision that balances conservation and development and integrates the plan through multi sector involvement.

A document titled "Guidelines for Integrated Planning for Conservation and Development of the Dong Ho lake, Vietnam" were developed by the GIZ project in strong consultation with BRMB. The document was endorsed by the Kien Giang BRMB in 2012 and it will be used to direct future planning and management of the lake. The main planning principles of the guidelines are:

- To maximise protection of remnant and regenerating plant communities;
- To restore plant communities that buffer the waters of the lake from nutrient and sediment pollution;
- To minimize inflows of sediment, nutrient and toxic chemical pollutants;
- To maintain the hydrodynamics of the lake and its associated marine system;
- To achieve sustainable use of natural resources; and
- To foster the protection and celebration of the natural and cultural values of Dong Ho and its surrounds as part of the socio-cultural character of the local community as well as that of the Province and Vietnamese people.

Conclusion

The Biosphere Reserve has proved to be an important instrument in the protection of the natural resources of Kien Giang Province in the context of the rapid socioeconomic development. With technical assistance and capacity building from the GIZ project, the University of Queensland and others, provincial agencies have been able to make the Biosphere Reserve operational. The current integrated coastal management plan and integrated planning for conservation and development of the Dong Ho Lagoon are only two examples of how the BR can be used as a cross-sectoral management tool to overcome the limitations of the sectoral planning for sustainable management and use of natural resources. This provides a lesson for other Biosphere Reserves.

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20. GUBBI GUBBI GUN'DOO YANG'GA'MAN (CONSTRUCTING GUBBI GUBBI CANOES): BIOMIMICRY IN INDIGENOUS ART AND CRAFT

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Abstract

In common with other Australian Aboriginal groups, the Gubbi Gubbi people (Sunshine Coast Queensland) found templates for their arts and crafts within the shapes of the landforms, flora and fauna of their local environment. This paper examines how a current project reconstructing traditional bark canoes on the Sunshine Coast despite limited images and specimens is awakening a deeper appreciation of how Indigenous biomimicry encapsulates a rich lore concerning seasons and other environmental patterns.

Keywords: Indigenous culture, Sunshine Coast history, Gubbi Gubbi traditions, canoes & watercraft, biomimicry

Biomimicry in Indigenous Art

Ever since Janine Benyus popularized biomimicry (Benyus 1997) the concept has found applications in architectural design (Loo 2007) and even as a mode of aesthetics (Hosey 2012). Although most models were originally derived from North American first nations, Australian Aboriginal culture has provided an occasional inspiration (Huelat 2008).

Within the study of Australian Aboriginal art, it has long been recognized that most art motifs were taken directly from the natural environment. Recurrent designs or patterns were often, for example, mimicking the leaves or pods or significant plants, or parts of the anatomy of specific animals (see Johnston 2003: 156-7). In this sense, the environment was the continual template for Indigenous arts and crafts.

Within Aboriginal Australia, this practice embedded highly significant spiritual beliefs. Natural templates were valued and replicated because they were read as emblems of the creative Dreaming Heroes who had become part of the landscape or part of the various flora and fauna. For example, a particular wavy line might be repeatedly used as a pattern because it looked like the ripple left by the tide washing over a particular stone headland that was identified as the body of a Dreaming Hero (Morphy 1999: 13). In Arnhem Land, many distinguishing motifs of the area's rock and bark painting: parallel and latticed bands, dashed infill and cross-hatchings - have been found to refer to some of the distinguishing features of the local environment: spear grass, waterfall spray rainbows, scrambling possum tracks and turtle or sand crab tracks (Morphy 1999, Taylor 1999). Even the extensive use of particular hues – for instance, white backgrounds in Kimberleys region paintings – have specific enviro-spiritual references: white for many Kimberleys groups representing the white breast of the bustard - a key totemic animal of the Adbularia moeity (Akerman 1999: 17).

Replicating such patterns helped re-enact, perpetuate or even restore the Dreaming (Holmes 1995). As the entire natural environment was seen as criss-crossed with innumerable signs from the Dreaming, every natural pattern was potentially a source of artistic inspiration.

Apart from this, individuals' understanding of ceremony, law, self and socio-political identity was often encoded through such designs (Taylor 1989: 24-5 13). Group affiliation to specific territories was usually "read" in terms of designs that were replicated at various sites, and these designs were usually segments of plants, animals or landscape features that typified (identified) that particular domain. This manifested not only as differences in rock art (David & Cole 1990, David & Lourandos 1998, McDonald & Veth 2006, MacDonald 2008), but also as differences between how groups

constructed their ceremonial sites (Satterthwait & Heather 1987: 6, 35) and also the style or use of wooden, basketry and stone artefacts (Ferrier 2002). It now even argued that transmission of identity – be it language-group, clan or individual – *occurred largely through objects and their decoration* (Layton 1989: 9, Best 2003, Kerkhove 2011). This evidently explains why certain styles or designs had such restricted distribution (Best 2003: 161). In fact, some artefacts or symbols are being identified as "territorial demarcations" (e.g. the Kalkadoon 'anthromorphs' (Ross 1997).

Environmental templates for Gubbi Gubbi art

The Gubbi Gubbi are an Aboriginal group whose region largely covers today's Sunshine Coast/ Cooloola/ Wide Bay area within south-eastern Queensland. This is still one of the most biologically diverse areas in Australia, but it did possess distinguishing features: the Great Sandy Region; various types of rainforests and vine forests, wetlands (including the Noosa lakes system), lemony-scented grassy open forests (largely of narrow leafed red ironbark, lemon scented gum, etc. with an understorey of tussocky kangaroo and wallaby grasses), natural heathland plains, and peculiar native 'pine' forests (stands of hoop, bunya, cypress, kauri etc.). As Sheehan noted, this created a "sub-tropical and coastal environment... a fairly unified natural geographical unit" (Sheehan c.1985: 2).

It seems that the region's bright hues and dramatic contrasts (blue sky, white sand, the orange, pearl or blackened bark of local trees) may have formed the template for designs all over this and adjacent south-east Queensland regions (see Figures 1, 2 and 3).

Figure 1: Sandy-coloured body paint (Dulingbara – Noosa Region: Robin Wells)
Figure 2: Contrasting hues in a Sunshine Coast Forest (Kerkove)
Figure 3: Body paint Cherbourg 1930s (Queensland Museum)

Certainly the traditional arts of what David Horton calls the 'North-east region' (the area from central coastal Queensland south to north coast NSW) were markedly different from that of Central Desert, Arnhem Land or other Australian regions (Horton pers. comm., 2006).

However, as might be expected, the most usual 'emblem' the Gubbi Gubbi drew from their environment was the bunya pine – bunya nuts being such an important resource and the focus of huge gatherings. As even Mathew noted, 'bunya country' encompassed all of the region (Mathew 68-70). Motifs of bunya trees appear repeatedly on body-painting from the region. Bunya markings were also replicated by the Gubbi Gubbi headman Yabva (Fred Embry) on *djan'djari* (spirit) figures he carved. (Bond 2011: 14).

Other Gubbi Gubbi designs were taken from rainforest elements such as honey, the fern tree and

staghorn (Kelly 1992; Alex Bond personal comm, 2010), or from the ripples of the Mary River (Lyndon Davies per comm., 2011). As the mullet run was a central event for the region, a design consisting of a fish vertebra was also used on shields and body art (Gaiarbau in Langevad 1982). Another emblem seems to be the same flower - *boronia keysii* – that is today the Noosa Shire's emblem (Kerry Neil, personal communication, 2010).

Distain, neglect and rediscovery: the challenge of *Gubbi Gubbi Gun'doo Yang'ga'man* ('constructing Gubbi Gubbi canoes')

The rich lore of artistic themes that the Gubbi Gubbi people imbued from their environment was little appreciated with the onset of white settlement. The "demise" of Gubbi Gubbi canoe-making is a good example of what happened to all Indigenous art of the Sunshine Coast as a whole.

When - in 2012 - a small team of Gubbi Gubbi craftsmen (Lyndon Davis, Brent Miller, Kerri Jones and Nathan Morgan), with the support of the Sunshine Coast Council's Heritage Levy, set about researching and physically reconstructing traditional-style Gubbi Gubbi bark canoes, they found that not a single canoe specimen or image had survived for the entire region. One (now deceased) elder – Clifford Monkland – has since been to have constructed a canoe as recently as a few decades ago (Nurodeen Serico, personal communication 2013), but even this knowledge had been lost. The 'disappearance' was so complete that canoes are little mentioned in historic accounts after c.1850, and for almost fifty years the nature and existence of any type of watercraft in pre-contact south-east Queensland was severely questioned (Davidson 1935; Doran 1981; Steele 1976).

In part, such neglect was due to the Gubbi Gubbi and their neighbours rapidly adopting European boats as they found work in boating and fishing for white settlements (see Kerkhove 2013), but another obvious reason was "culture shock" - European distain and incomprehension. The tied bark canoe seemed unbelievably rudimentary. The radical simplicity of its organic form baffled the Europeans who first encountered it. James Cook described the vessels "as mean as can be conceived" whilst Flinders though them "misshapen and clumsy" (Steele 1983: 35-36).

However, all was not as it seemed. Even Cook, as he journeyed up Australia's east coast, altered his attitude, finding "they do very well for the purpose they apply them to, better than if they were larger" whilst Flinders started to be moved by their gracefulness:

> ...standing up in their canoes, and pulling towards them, with all their strength, in very regular order. They seemed to have long poles or spears in their hands, with which they also appeared to be paddling, the whole of them shifting their hands, after the manner of the South Sea Islanders (Steele 1983:22).

Nowadays the complexity and subtlety of Aboriginal art and craft is better recognized, as is the environmental technology underpinning the seeming paucity: economizing design and materials in a drive for ever-greater simplicity and ever-greater attunement to environmental resources, to the point of becoming "walking encyclopedias" of survival skills and natural lore (Clendinnen 2005). It is in this context that the Gubbi Gubbi canoe is being revived on the Sunshine Coast, bringing with it a wealth of insights into inter-connections within the local environment.

Biomimicry in south-east Queensland Aboriginal canoe lore

Many of the discoveries have been by the Gubbi Gubbi participants themselves in the process of reconstructing the canoes. Lyndon Davis found that for other Aboriginal communities he spoke with, the shape of canoe hulls often copied a specific landform of their region – for instance, a significant valley (Davis personal commun., 2012). This led him to conclude that something similar must also have operated on the Sunshine Coast.

From his knowledge of his traditional language, Lyndon knew that *julara* – the word for "mullet" –

was also the word for stringy bark, one of the main materials used in canoe construction. Indeed, 'bark' and 'canoe' was similarly the same word in his language: *gun'doo* or *gun'dool* (Watson 1944: 12; Petrie 1904: 97). Stringy bark canoes were used in mullet fishing. In fact, when the stringy bark shed its bark, it was a sign that the mullet were running and ready to be 'harvested' (Davis person. comm., 2013).

Similar seasonal indicators existed for bunya nuts – i.e. the sugar gum shed its bark when the bunya was fruiting, and the resultant white (new) bark of the sugar gum was seen as related to the bunya tree, being the same colour and texture as bunya nut kernels. Likewise, the fishing spear used for mullet fishing had prongs shaped exactly like a sea eagle's talons and indeed, the mode of fishing mullet that sea eagles followed was replicated by the Gubbi Gubbi, even down to what fish were selected or left (Davis person comm.., 2013).

Such 'fragments' hint at the existence of a precise science – and art – of examining and mentally equating 'natural coincidences' - correlating seasons, flora and fauna with human designs and human activities. Certainly the form of canoe hulls in this district seems to have originated from environmental examples. Water carriers were made very similar to canoes: tied and skewered (David Payne, pers. comm.., 2013), and were simply fronds off piccabeen palms. This was probably the major template.

Figure 4: Hervey Bay canoes 1956 (State Library NSW)
Figure 5: Moreton Bay chestnuts

Another template seems to have been the seed pods of the black bean/ moreton bay chestnut (*castanospermum australe*). Bark canoes that artist John Bonar sighted and painted on Hervey Bay (1856) are remarkably similar in shape to split black bean pods (see Figure 4). Moreton Bay chestnuts (see Figure 5) mostly grow along creeks and rivers in sub-tropic regions of NSW and Queensland. In summer, the pods split into canoe-shaped halves and are often encountered floating down various Sunshine Coast and Moreton Bay streams – a feature that has been noted since the 19th century. The pods served as 'toy canoes' for both Indigenous and non-Indigenous children on the Sunshine Coast in recent decades and probably for generations (Brent Miller, pers.comm. 2012). This could signify that they influenced canoe design. Certainly Constance Petrie recorded a Dreaming story concerning use of the chestnut pod as a watercraft:

> A very long time ago a carpet snake and a black snake started out in a canoe, in time of flood, from the mouth of the Pine River. Marvelous as it may seem, their canoe was just a shell of the Moreton Bay chestnut (" mai") —probably a gigantic one! (Petrie 1902:739).

Intriguingly, the Moreton Bay chestnut fruits in spring or early summer, which was the time – "when the sap was running up" - that bark canoes were often built (Petrie 1904).

Conclusions

Increasingly it is appreciated that Aboriginal Australians drew much of their aesthetic and technological inspiration from their immediate natural environment. The extent to which the patterns they encountered (and replicated) in this interaction created an entire science of relationships – between individuals, groups, language, Dreaming Ancestors, seasons, colours, art forms and specific species – is much less understood.

Indeed, the 'natural coincidences' the Gubbi Gubbi discovered (between mullet movement and stringy bark peeling; between bunya fruiting and sugar gum peeling etc) have yet to be adequately explained. The organic "simplicity" of the Gubbi Gubbi canoe project has started to reveal a small portion of this dynamic world. It appears that biomimicry in this case physically encapsulated a rich lore concerning environmental patterns and seasons.

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21. NOOSA BIOSPHERE RESERVE: A TOOL FOR PROMOTING 'I/THOU' RELATIONSHIPS AND ACTION

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Abstract

The hosting of Balance-Unbalance 2013 was situated within the UNESCO endorsed Noosa Man and Biosphere Reserve (MaB) as the conference goals were seen to closely align to those of the global Biosphere Reserve network. The concept of Biosphere Reserves is for them to act as incubators for local sustainable development projects and to share this information and learning with other Biosphere Reserves and beyond. They can therefore be seen as potential tools for promoting authentic 'I/Thou' relationships between people and with the environment. The Noosa region is a special place because of its beautiful natural environment, but also the people and groups who have worked to look after it for generations. This article outlines the focus of Biosphere Reserves, the background to Noosa Biosphere Reserve and the importance of focussing on relationships, communications, creativity and action to help achieve biosphere principles.

Keywords: Biosphere Reserves, UNESCO, Noosa, creative communities

Biospheres - people and place

If we wish to envisage and create a preferred future, a future where humans live in a balanced relationship with the natural environment, we need to consider the important role of human interactions and relationships with place. We also need to consider the nature of the relationships between humans, and between human and non-human beings and aspects of our world. Finally, we need the means, the tools and processes for enabling positive relationships and productive action. One of the organisational and conceptual means of engaging in this process is through the United Nations Educational, Scientific and Cultural Organisation (UNESCO) Man and Biosphere (MaB) program. Biosphere Reserves are designated sites which are meant to serve as living laboratories for conservation, sustainable development and learning. The focus of these reserves is on looking after places with significant natural environments and ecosystems, but also on human interactions within such. This article outlines the importance of social engagement and on mediating means and tools for cultivating positive activity and relationships. These caring relationships with people and between people and non-human aspects of place are fundamental to creating a future where human and non-human life and the environment can continue to exist in balance.

Human interactions and 'I/Thou' relationships for a sustainable future

UNESCO states that the 'World Network of Biosphere Reserves is a unique tool for international cooperation and emphasise the important of the role of biosphere reserves as learning sites for local and regional sustainable development (UNESCO, 2009), Biosphere Reserves are places that have significant terrestrial and/or coastal and marine ecosystems, but also people and communities who wish to work together to both preserve these systems and also explore how to enable sustainable economic and social development.

As Keen, Brown and Dyball (Keen, Brown, & Dyball, 2005) outline in their book on environmental management for a sustainable future, social learning and collective action that draws on partnerships between communities, professionals and governments is essential for realising such a future. However, the nature of these partnerships and how they might effectively be utilized to bring about effective learning processes and change is often not examined or addressed. The importance of people and relationships is therefore central to programs that endeavor to preserve or create diverse ecosystems,

communities and environments.

According to Putnam and others, social capital, social networks and connection to community is key to building and maintaining democracy (Putnam, 1995, 2002). Networks, trusting relationships and civic participation are all identified as important features of effective social systems. The nature of these relationships is important to consider, both in terms of relationships with humans and the environment.

The importance of connections and relationships as described by Martin Buber's 'I/Thou' relationship is an interesting concept to consider. Buber was a twentieth century philosopher and he described two major ways people could relate to other people and the environment: through an 'I/Thou' or an 'I/It' relationship. His notion of the 'I/Thou' relationship describes an authentic, wholistic connection and affinity, a mutual relationship that is respectful and caring. This is differentiated from the 'I/It' relationship which is more of a monologue where other things and where people and the environment are treated as objects to be used (Buber, 1958; Rotenstreich, 1991/2010). While the experience of I/Thou relationships may be a connected, total and immediate one, the means by which this is achieved will often involve mediating tools, frames and technologies. Tools in this sense can include technologies, but can also include human cultural tools such as organisational forms, skill-sets and conceptual tools. These all may enable and mediate the sense of closeness, dialogue and connection.

Mediating tools, organisational structures, technologies and experiential frames can therefore be the means for enabling the creation of respectful relationships between people and between people and place. Ideally they help nurture mutual relationships, with participants connected to others and the natural world through relationships which are caring, respectful and compassionate.

It is fruitful therefore to consider what the features are of respectful and positive relationships between humans, and to consider how they apply to the environment and natural world as well. Key features of a caring relationship may entail:

- Attending to the other
- Knowing the other
- Interacting with the other
- Feeling for the other
- Engaging with the other
- Respond and reflecting upon experience with the other.

The Man and Biosphere concept can be considered as a mediating tool which aims to promote I/Thou relationships, with its focus on recognizing and working towards balanced human interactions within the natural world. The following account will outline the background and key features of the Noosa Biosphere Reserve and different activities and tools that have been used to generate community knowledge, partnerships and relationships.

History and background of Noosa Biosphere Reserve

The Man and Biosphere program was initiated by the United Nations Education, Scientific and Cultural Organisation (UNESCO) in the 1970s as a practical tool to deal with some of the most important challenges of our time: *"how can we reconcile conservation of biodiversity and biological resources with their sustainable use"* (UNESCO, 1995, p.3). The concept of Biosphere Reserves is for them to act as incubators for local sustainable development projects and to share this information and learning with other Biosphere Reserves. The concept can therefore be considered as a tool for enabling respectful dialogue and relationships.

There are three broad biosphere goals, which are:

- To promote the conservation and protection of the environment including landscapes, ecosystems, species, biological and cultural diversity

- To encourage and advocate sustainable development, community resilience and promote community adaptation in response to climate change
- To engage in research, monitoring and learning activities related to conservation and sustainability and share knowledge, locally, nationally and internationally.

The Noosa Biosphere Reserve was recognised by UNESCO (United Nations Educational, Scientific and Cultural Organisation) in 2007 under the Man in the Biosphere (MaB) programme. The Noosa Biosphere Reserve was the first to be recognised in the state of Queensland in Australia. Since then Great Sandy Biosphere Reserve has been designated immediately to the north.

The Noosa region is a special place because of its beautiful natural environment, but also the people and groups who have worked to look after it. We acknowledge the thousands of years of respect and harmonious interaction with the environment by our Indigenous people prior to European settlement and the more recent history of respect for the environment that has been actively cultivated for over 50 years. The Biosphere Reserve designation was in part recognition for the ways that the Noosa community has been a leader in sustainable development practices for many decades through both community action and local government policy, planning and decision making.

It has been acknowledged that the Biosphere Reserve concept was ahead of its time with its recognition of the integral role of human interaction in consideration of sustainable ecologies and economiges. As Brunckhorst, Bridgewater and Parker identified, many of the early MaB reserves were areas which included notable natural environments and existing national parks (Brunckhorst, Bridgewaqter, & P, 1996). For example in Australia early nominations were at Kosciuszko, Macquarie Island and Uluru. Many of these locations did not include significant human settlement and populations. The new generation of Biosphere Reserves therefore are locations where there is a focus on sustainable human development and that is very much a feature of Noosa Biosphere Reserve. Some of the key features of Noosa Biosphere Reserve are outlined as follows.

The Noosa Biosphere Reserve is recognised for its rich biodiversity. Contained in its area of 875 square kilometres are:

- 35% protected land such as national parks, conservation parks, state forests, vacant crown land, lakes and streams
- Over 44% of all of Australia's bird species
- 1,365 species of plants
- 711 species of native fauna
- 60 distinct ecosystems.

The Noosa Biosphere Reserve is also significant because it includes celebrated holiday destinations and a tourism industry. It incudes an internationally recognised beachside resort town, hinterland villages, farming areas and a range of industries and businesses. The Noosa region has a long and rich cultural history. This is featured in local museums, information centres, libraries and galleries. It is also home to many practising artists and cultural groups. A number of internationally renowned festivals are held in the region including the green art focussed 'Floating Land' biannual festival.

Another special feature of Noosa Biosphere Reserve is its governance structure. Noosa Biosphere is promoted through a number of community sector boards and a governance board under the auspices of Noosa Biosphere Limited. The community board model was used by the former Noosa Council as part of its community governance thrust to engage members of the community and was a feature of the successful UNESCO application. The community sector boards include:

- The Cultural Board - advises on cultural heritage and contemporary arts, and strives to preserve, promote and enhance the Noosa Biosphere Reserve's unique cultural identity.
- The Economic Sector Board – this Board's focus is economic sustainability and equity, communities meeting present needs whilst not compromising the ability of future generations to meet their needs.

- The Environment Sector Board – concentrates on places, the life supporting capabilities of the landscape, atmosphere and waterways and what they comprise, as well as the ecological process and systems of the biosphere reserve area.
- The Social Sector Board – concentrates on people, the social well-being and cohesion of communities and the way people interact with each other and the environment.
- The Education, Research & Development Board - this Board's focus is to facilitate learning and research in partnership with educational institutions and the community and to encourage sustainable development practices through education and research that involves active participation.
- The Tourism Noosa Board – Tourism Noosa is charged with strategic Tourism industry development, marketing of the biosphere reserve region to domestic and international consumers, the travel trade and general media. They have a sustainability strategy that Noosa Biosphere Ltd has been working with them on.

Some of Noosa Biosphere Reserve's current projects serve to demonstrate the value of cross-disciplinary and cross-sectoral work that is possible through working with diverse partners, professional contractors and volunteers within the local community. What has been apparent is that while the ultimate goal is the maintenance and nurturing of a healthy natural environment, that to achieve the goals of conservation and sustainable development requires a key focus on communications, community engagement and projects to generate and share knowledge. This is largely because the Biosphere Reserve concept is not as well known or regarded in Australia as the UNESCO World Heritage status. This issue is not specific to Australia though as a 2010 report identified (UNESCO, 2010).

Progress towards UNESCO goals

Noosa Biosphere Ltd has been the catalyst for a spectrum of local initiatives since its inception in 2008. The core activities of NBL address many of the MaB goals and Madrid Action Plan (MAP) areas (UNESCO, 2009), the broad categories of which are:

- E1 – Cooperation, management and communications,
- E2 – Zonation, linking functions to space
- E3 – Science and capacity enhancement, and
- E4 – Partnerships.

These foci can be seen to potentially contribute to the creation of 'I/Thou' relationships with people and the environment through their recognition of people focussed actions (communications, and partnerships) as well as promoting understanding and connection to environment through building knowledge about the specific features of the biosphere reserve.

The majority of projects for Noosa Biosphere Reserve focus particularly on E1 - cooperation, management and communications and E4 - partnerships. Projects and activities are most often realised through Noosa Biosphere working with partners, professional contractors and volunteers within the local community. At any point in time the various boards and working parties have a range of projects in train. Recent projects which have utilised community action for promoting learning and knowledge include developing a Noosa Climate Action Plan, a State of the Biosphere Report and educational river cruises.

Many of Noosa Biosphere's projects have a specific focus on using the arts and creativity. This is in recognition of the power of the arts to encourage the participation of individuals and groups in learning and action as well as communicate concepts in diverse engaging forms. Some of the arts-based projects have included the Noosa Biosphere Art Prize, arts-based components of the Noosa Biosphere Festival and support for the Floating Land green art festival and the Noosa Surface Design project and competitions.

One related project supported by Noosa Biosphere is that of Biosphere Soundscapes - a large-scale

interdisciplinary project that was conceived and developed in Noosa Biosphere Reserve by Australian sound artist Leah Barclay (2013). The project is designed to inspire communities across the world to listen to the environment and re-imagine the potential of biosphere reserves as learning laboratories for a sustainable future.

Biosphere Soundscapes is underpinned by the creative possibilities of soundscape ecology, a rapidly evolving field of biology used to record environmental patterns and changes. The project aims to connect and inspire the communities of global biosphere reserves through emergent technologies, innovative creative practice and soundscape ecology all revolving around a global sound map online - www.biospheresoundscapes.org. The project is currently expanding in ten international Biosphere Reserves across five continents, with the hope that it will be actively mapping the changing soundscapes of thirty biosphere reserves within the next six years.

Noosa Biosphere Partnerships

Partnerships are a core component of the way Noosa Biosphere engages and are key to advancing knowledge, understanding and action. Partnerships often begin with personal connections between people on sector boards and other community organisations, businesses, educational institutions and local government. They develop fruitfully when there is a purpose for collaboration and so many of NBL's projects are carried out through multiple partnerships, many of which are now being formally recognised. A set of criteria have been developed for organisations to work towards to achieve 'partner' status and a special logo is used by those who are recognised partners. Two phases of partnership have seen a true cross-section of groups entering into this relationship with partners including:

- Environment and natural resource management groups - Noosa and District Landcare, Noosa Integrated Catchment Association, South East Queensland Catchments and the Wildlife Rehabilitation Centre at Eumundi.
- Educational institutions - University of the Sunshine Coast, Sunshine Coast Institute of TAFE and CQUniversity;
- Tourism operators, businesses and groups - Sheraton Noosa Resort and Spa, Noosa Outrigger Little Hastings St, Noosa Ferry Cruise, The Original Eumundi Markets and the tourism industry group Tourism Noosa; and
- Community groups - Noosa Federation of the Arts, Sunshine Beach, Noosa Heads, and Peregian Surf Lifesaving.

Relationships are being developed beyond the local level and the international reputation of the Noosa Biosphere Reserve is also growing. Over the past few years there has been an increasing number of requests for information and visits from international students interested in learning more about biosphere reserves and their management. A number of delegations of knowledge seeking visitors from Indonesia, China, the Netherlands, Canada, Chile, Vietnam and Cambodia have also visited the region. Noosa Biosphere has also been instrumental in attempting to establish more rigorous dialogue amongst the biosphere reserves in Australia.

Noosa, Biosphere Reserves and future cultures

Noosa Biosphere is now is a position where the organisation and community has a set of tools and mechanisms which can help promote 'I/Thou' type relationships between the community and the non-human elements of place. A great deal of the success that has been experienced by the Noosa Biosphere in the past five years has come as a result of collaboration and sharing experiences with other biosphere reserve communities. Over this time period Noosa Biosphere has been fortunate to receive delegations of knowledge seeking visitors from Indonesia, China, the Netherlands, Canada, Chile, Vietnam and Cambodia. Noosa Biosphere has also been instrumental in attempting to establish more rigorous dialogue amongst the biosphere reserves in Australia. Noosa Biosphere considers that a key opportunity exists for MaB to assist in further developing these collaborations by providing assistance in identify opportunities for interaction between biosphere reserves, and in working with national governments to encourage them to give greater recognition to the role biosphere reserves in the countries of origin. MaB could also assists by facilitating higher levels of interaction and

engagement between international organisations and multinational business interests with biosphere reserve managers to progress sustainable development programs that cross national borders and bring achieve outcomes that contribute to the global sustainability agenda.

There are great opportunities for the MaB network to leverage other tools into the future, especially utilising the rich possibilities of technology to design and create effective platforms for sharing knowledge and facilitating collaborations. This may be particularly important for coastal and island biosphere reserves like Noosa which will continue to experience and need to respond to the ramifications of climate change.

Noosa Biosphere Limited has achieved a significant amount in five years, establishing an effective cross-sectoral governance structure that draws on diverse professional knowledge and skills, local government support and volunteer efforts. The Sector Board model and Partnership program can be seen as community-based tools which allow a significant number of people to be involved in active programs and so contribute to spreading the message about biosphere principles. The biosphere reserve concept and related programs can be seen as having the potential for nurturing knowledge, caring and respect between people and places. Finally this is a model and tool for promoting the type of 'I/Thou' relationships which are required to serve people and the planet into the future.

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