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It is the paper published as:

Author(s): Mungai, N.W.

Title: Critical Review Essay: Sustaining native biodiversity through conservation and nature-friendly farming

Journal: Rural Society: the journal of research into rural and regional social issues in Australia

ISSN: 1037-1656

Year: 2014

Pages: 198 - 208

Volume: 23

Issue: 2

Abstract: Growing populations, farming into virgin lands and industrialization over the last two centuries have led to relentless destruction of native biota on land and sea and there is growing awareness that this process of extinction of species could be accelerated by human-induced climate change. Farming virgin lands poses the risk of destroying unique native species and agriculture and conservation appear like two diametrically opposed endeavours. This approach is undergoing serious rethinking by sci ...

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CRITICAL REVIEW ESSAY: SUSTAINING NATIVE BIODIVERSITY THROUGH CONSERVATION AND NATURE-FRIENDLY FARMING¹

Ndungu wa Mungai²

ABSTRACT

Growing populations, farming into virgin lands and industrialization over the last two centuries have led to relentless destruction of native biota on land and sea and there is growing awareness that this process of extinction of species could be accelerated by human-induced climate change. Farming virgin lands poses the risk of destroying unique native species and agriculture and conservation appear like two diametrically opposed endeavours. This approach is undergoing serious rethinking by scientists, farmers, policy makers and other interested groups who argue for cooperation in finding a solution. Two recent books underline this change in thinking. *Linking Australia's Landscapes* (Fitzsimons, Pulsford, & Wescott, 2013b) and *Nature and Farming* (Norton & Reid, 2013) demonstrate how careful management of farms and conservation areas could be mutually beneficial. For this to be fully realized there is need for greater cooperation between farmers and conservationists so that knowledge is shared and common goals and vision identified. Social workers and other social scientists also have an important role as conservation and sustaining biodiversity is a concern for all humanity as we deal with the consequences of climate change, industrial pollution, species extinction and diminishing protected conservation reserves from human encroachment. These two publications are therefore very timely and useful resources for agricultural and environmental sciences students, academics, policy makers and researchers as well as farmers and general readers in Australia and New Zealand.

Key words: biodiversity; connectivity; conservation; nature; farming; ecological perspective; social work.

INTRODUCTION

During the settlement of Australia over the last two centuries progress was understood in terms of land clearance and introduction of exotic plants and animals. This has made Australia a major producer and exporter of primary products as well as manufactured goods. The down side has been the degradation of the land, contribution to the green house gases emission that are responsible for climate change, introduction of species that have ruined the land and native species. Settlement also affected the indigenous population and disrupted their way of life and relationship to the land. The threat posed by land clearing and habitat degradation continues to this day and between 2000 and 2010 an estimated one million hectares of bushland were being cleared per annum (Worboys & Mackey, 2013). Agriculture, mining and urbanisation are major reasons for land clearance.

Broadacre vegetation clearance is now restricted by legislation and planning rules but in the past it was a common practice that would have put at risk many native species. The extinction of species is an irreversible ecological threshold (Norton & Reid, 2013). Genetic engineering promises to revive extinct species but it is a costly process that is still at experimental stage if not in the realms of science fiction (Zimmer, 2013). Extinction is a critical issue because

¹ The author trained in social work and agriculture in Kenyan and Australian universities before changing career direction to become a social worker practitioner and academic.

² Charles Sturt University. Email contact: nmungai@csu.edu.au

native biodiversity of a farm, region or country is unique and found nowhere else (Norton & Reid, 2013). Farmers, developers and miners may not be aware at the time of clearance that their actions would lead to extinction, hence the importance of careful planning where native species are likely to be affected.

One of the approaches in the past in conserving native species was to create conservation islands such as national parks and game reserves. There is growing realization that this may not be enough as species continue to be lost outside the reserves and the reserves themselves have limitations of size, diversity of ecosystems and also give a false sense that enough is being done. This article reviews two recent approaches in addressing these problems and include establishment of many strategically planned large-scale conservation corridors (Fitzsimons et al., 2013b) and having farmers involved in the conservation of biodiversity within their farms as responsible custodians (Norton & Reid, 2013). These are not unrelated approaches as farms could be part of the corridors. The farmers understand that they stand to benefit from conservation, either directly or indirectly and the conservation efforts also benefit the planet in general in known as well as yet unknown ways. A social work/social science perspective is added to emphasise that science alone is not enough to solve ecological problems.

CONSERVATION CORRIDORS

Conservation corridors also referred to as connectivity conservation or network conservation among other names have captured the imagination of conservationists in Australia and around the world. It is a brilliant concept but a challenging one as there are many stakeholders involved, different landscapes, different land uses as well as protected and unprotected areas. The thinking behind the creation of corridors is to provide options and opportunities for species to disperse and migrate across landscapes in response to stress such as temporary drought or more long term crisis such as climate change. Corridors can also be created across national boundaries as demonstrated by the Yellowstone to Yukon (Y2Y) between Canada and the United States:

The Yellowstone to Yukon (Y2Y) corridor of the USA and Canada (for example) through the actions of *dozens* of conservation groups and land trusts is working to maintain natural interconnections between Yellowstone National Park and the Rocky Mountains national parks of Canada. The aim of this work is to help conserve habitats and movement corridors of the *Grizzly Bear* (*Ursus arctos horribilus*) and other species across private lands to help prevent the remnant Yellowstone bears being genetically isolated (Locke, 2010) (Worboys & Mackey, 2013, p. 8).

Connectivity conservation as a 21st century is a grassroots as well as government initiative that requires considered planning, design and implementation because of the different stakeholders involved. It also helps if accountability is devolve to different community groups to create a sense of ownership and accountability but at the same time it is overseen by a body that oversees and links the whole program. Devolvement is also very empowering to the groups involved. Different areas need to develop approaches that are appropriate to their needs. South Africa for example, achieved the goal of establishing connectivity corridors through ‘a structured connectivity conservation management program by the South African government, [that offered] stewardship payment, stable and experienced corridor

management staff and [included] varying degrees of voluntary participation by farmers and stakeholders' (Worboys & Mackey, 2013, p. 14). This is in contrast to the a trail blazing Yellowstone to Yukon (Y2Y) connectivity corridor of USA and Canada which was initiated and driven by committed citizens, supported by philanthropic investment, and coordinated and managed through a Board of Management (Worboys & Mackey, 2013). These two different approaches demonstrate how taking the local situation into account is so crucial to the success of these initiatives.

Connectivity conservation offers hope that land that has been devastated by reckless human activity could be reclaimed and biodiversity maintained at a healthier level than is currently the case. More has to be done for that to be realized. In south-eastern Australia, where white settlement started and much clearance has been done, the ecological impact of past clearing and fragmentation mean that more time and space is needed to reclaim the native biodiversity (Mansergh, 2013). Whether land and resources like water should be allocated to conservation or irrigated agriculture can sometimes lead to tension between environmentalists and farmers and lead to disagreements that are difficult to resolve as experienced with the Murray-Darling Basin in Australia. Mansergh (2013) argues that overallocation of land and water to agriculture at the expense of conservation and the Indigenous people is a historical error in need of redressing and cites the Murray-Darling Basin as an important area where linkage to other conservation programs or networks is missing.

FARMERS CONCERNED

Biodiversity is of direct importance to farmers as a source of direct essential services, such as pollination by insects and birds. Farmers also use native biota such as native pastures for their livestock and there are many other benefits that may or may not be obvious within the current state of knowledge. It is heartening to know that some, if not many, farmers acknowledge the integral role of biodiversity in their farm business (Norton & Reid, 2013). The knowledgeable farmers therefore know that biodiversity is essential to a healthy ecosystem which covers their farms and extends to the planet as a whole. It is also essential to the aesthetics of the surroundings for relaxation and potentially for other aspects of the regional economy such as tourism which some farmers are able to exploit by offering specialty farm products.

It is easy to see the farmers as the villains in the destruction of biodiversity in Australia and New Zealand as well as other places in the world but the issue is more complex. Since settlement farmers have not only directly contributed to the dispossession of Indigenous people but have also cleared native vegetation and replaced it with exotic pastures and introduced European animals such as dairy cattle and sheep. The natural flow of rivers has also been interfered with and excessive amounts of water allocated to agriculture (Mansergh, 2013). The diversion of water has been detrimental to the wild life particularly in the Murray-Darling Basin. On the other hand, the farmers have been heroes in producing food to feed an ever growing population, export the surplus food and fibre to support a robust first world economy and also produce raw materials for industry. The viable economy that is supported by these farming activities is going to be crucial in supporting successful biodiversity conservation in agricultural lands (Norton & Reid, 2013). Acknowledging the historical damage is important in designing research-informed programs for conservation in future.

Human settlement, both European and Indigenous, has had major impact on the fauna and flora in both New Zealand and Australia. The Moa in New Zealand and the megafauna in

Australia are believed to have disappeared with the arrival of the Maori and the Aboriginal people respectively (Norton & Reid, 2013). The introduction of animals such as cats, foxes, camels and rabbits by the Europeans has had a devastating impact on the native fauna and flora in Australia. However, it has not all been bad news. Some native fauna have adapted and thrived well in the changed environment. Magpies, crows and ravens in Southern Australia and the swamp harrier, pukeko (swamphen) and paradise shelduck in New Zealand farming areas have done well and European settlement (Norton & Reid, 2013). It is important therefore for careful studies to be done to inform conservation programs. In the past the introduction of exotic species was done with little or no thought on the impact on the native species and the impact only became clear many decades later.

One of the major problems of indiscriminate land clearance is that it disrupts the ecology of the land. Ecological understanding recognises that plants and animals exist in complex relationship that may not be obvious to a casual observer. This has been described as a 'sacred balance' (Suzuki & McConnell, 1997). This is not a religious dogma but an appreciation of the complex web that exists in nature and which we can do great damage to by disturbing with little understanding.

Farmers, scientists, governments and environment conservation groups are now more enlightened and the initiatives being undertaken are more considered. The best example of how farmers can be part of the solutions is best exemplified by the Landcare groups around Australia (Norton & Reid, 2013; Walker, 2013). Landcare bridges the divide between farmers and conservationists and demonstrates the two can work together for common good (Walker, 2013). While Landcare was launched in Australia in 1989, New Zealand and other countries have since started their own variants of the model (Norton & Reid, 2013). The Landcare national network of groups of volunteers operates autonomously and they are supported by the government and the private sector to tackle land and water degradation and work towards sustainable natural resource management (NRM) (Norton & Reid, 2013). Landcare stimulates the farmers to think about the landscape function that underpin their farm productivity and integrity while also linking them to other farmers, scientists, and other advisers to advance their knowledge (Walker, 2013). The benefits of Landcare include ability to address problems such as salinity that cannot be confined to one farm; collective bargaining power of the group to lobby for funds and other resources; opportunity to pool ideas and resources; opportunity to interact with non-farming residents in a district and; opportunity to motivate one another to achieve more for the environment (Norton & Reid, 2013). The achievements of 25 years of Landcare have demonstrated what farmers and conservationists can achieve working together as well as the limitations of the movement.

There is still more that Landcare could achieve for the environment. To rise to a greater level Landcare would need to be a collaboration of all levels of government and community and aim for large scale connectivity (Walker, 2013). By moving in this direction without losing its current local focus and autonomy, the benefits would be magnified. Walker (2013) notes that moving towards large scale connectivity for Landcare would be difficult and expensive but worth considering.

EMPHASISING THE SOCIAL

The importance of scientific research and knowhow is absolutely critical if we are to avoid the mistakes of the past, rehabilitate degraded lands and conserve the biodiversity we have left. Equally important is the social relationships between people involved in these efforts. Scientific researchers are often not the best communicators as they write in a language that is inaccessible and often just write to each other in journals that are not read outside the discipline community as Lambert (2013) observes:

Those scientists are themselves under pressure to produce more peer-reviewed publications that influence their career prospects but may not be widely read outside academic circles, rather than spending time interpreting and sharing their knowledge (p.250).

This is not to dismiss the important contribution the scientists can make but to emphasise the importance of the way knowledge is generated and communicated. Social scientists with an understanding of people and how they learn and work together can be an important part of conservation. The key to the success of conservation efforts with groups, in addition to the scientific knowledge, is having a shared vision which becomes the point of reference throughout the collaboration and which also helps to build mutual understanding among the collective of participants (Lambert, 2013). This is where disciplines like social work, sociology, psychology and adult education can make a contribution to conservation programs.

Social work mainly concerns itself as a discipline with disadvantaged individuals, families and communities. There is however growing recognition that there is a strong link between environmental degradation and the problems experienced by social work clients (Dominelli, 2012; Pulla, 2013). There are other social aspects with a bearing on how the environment is damaged through corrupt practises and the assistance to the affected land and people is similarly hampered by lack of accountability and transparency (Dominelli, 2012). It is therefore clear that conservation, while informed by science, cannot be divorced from the social aspects that could either hinder or enhance conservation efforts.

Science tends to have a linear approach to problem-solving but a complex problem like the environmental problems we are facing need an integrated approach. Cox and Pawar (2013), writing on international social work, propose using an ecological perspective that incorporates scientific knowledge, social-economic and political change, and a spiritual response. Elements of this ecological perspective are touched on but not emphasised in both Fitzsimons et al. (2013b) and Norton and Reid (2013). Working predominantly in urban areas, social workers can address problems like food consumption and lifestyle patterns in urban areas which have an impact on the environment. Shepard (2013) has suggested that community gardens have been one approach that can help in cutting down food miles, cut costs of food for the urban poor and reduce the pressure on land to feed an ever growing urban population.

CARING FOR COUNTRY

Involving the Indigenous people in conservation has been a key aspect of creating large-scale conservation networks on Australian landscapes. 'Caring for country' is recognised as a

spiritual as well as an environmental practice that started with the land rights movement and now includes the blending of traditional knowledge with modern technologies in land and sea management (National Museum Australia, 2013). There are many examples where this is working. In the Territory Eco-link conservation initiative, for example, there has been cooperation with the Central Land Council in support of the Traditional Owners' efforts to 'look after the country' and in their aspirations for the declarations of Indigenous Protected Areas (Bridges, 2013). Bridges (2013) notes that the Indigenous protected Areas are a vital part of this transcontinental wildlife corridor that is linked with Naturelinks in South Australia, a distance of over 3,000 km from Arafura sea in the north to Port Augusta in the south.

An approach that makes use of the best of Western scientific knowledge and Indigenous traditional and local knowledge is a vital part of environmental research and land conservation. The Indigenous people are assisting in protection of endangered species on land and marine areas. Working with the Indigenous people has great benefits for them in terms of health, employment and self esteem and in turn they share their critical knowledge on managing their land with wide –ranging benefits:

Indigenous people provide a wide range of environmental services including border protection, quarantine, fire management, wildfire abatement, carbon sequestration and trading, weed control, feral animal control, biodiversity conservation, fisheries management, restoration of wetlands, water resource management, and sustainable commercial enterprises such as eco-tourism (Berry et al, 2010; Hunt, Altman and May, 2009: xxii). The diverse environmental activities to which Indigenous people contribute have positive outcomes for climate change mitigation, biodiversity monitoring, the protection of endangered species, landscapes health and more (Hunt, Altman and May, 2009: xi). (Australian Institute of Aboriginal and Torres Strait Islander Studies, 2011, p. 14).

Norton and Reid (2013) have mentioned Maori involvement in burning practises that have altered biodiversity in New Zealand but accelerated destruction happened with the arrival of the European settlers. The authors have also mentioned that the Maori iwi (tribe) owns the Mangatu forest which is riddled with goats and possums and introduced predators that threaten the native fauna in the 15,000 ha forest. The conservation management plans include setting aside substantial area of reserve (22%), active predator control program, restoration of some pasture and establishing a forest-wide biodiversity monitoring program. Funds are also made available to support the conservation work and such collaboration with the Indigenous people is an example of how cooperation is an integral part of conservation. Social workers are also concerned that human-induced climate change would have a greater impact on groups that are already marginalised, such as rural women (Boetto & McKinnon, 2013). The poor in developed and developing countries would also be disproportionately affected by such impact as rising sea levels and degraded farming lands.

GROUNDS FOR HOPE AND OPTIMISM

It is easy to despair when one considers the challenges like climate change, extinction of species, pressure on conservation areas due to growing populations in third world countries, land degradation and contamination from reckless industrialisation, displacement of people to make room for industrialisation and urban development and the overfishing of marine

resources. These challenges exist but there are also innovative programs being implemented to address them.

The issues of climate change is one that is of great concern as the impact of a rising sea level and extinction of some species that could not cope would affect humanity in ways that are difficult to imagine. The global nations, through the United Nations, have been working under the United Nations Framework Convention on Climate Change (UNFCCC) since 1994. Despite numerous conferences and the Kyoto protocol, however, a legally binding accord on emission targets has been elusive (Dominelli, 2012). While national governments have been disappointing in their failure to act, hope comes from local responses and initiatives that aim to achieve what the governments refuse to commit to. Beyond Zero Emissions in Australia is one such group offering hope by conducting research and providing education towards designing a zero emissions economy for Australia. The science of climate change suggests that emissions must peak by 2020 and start declining towards zero from there if catastrophic climate change is to be avoided (Green & Finighan, 2012). There is no evidence that the national governments have the will to achieve that but countries can still work individually and in small clusters, as suggested by Beyond Zero Emissions:

Instead of trying to do it all in one “grand bargain” as they are today, countries should work in smaller groups, focusing their efforts on the individual sectors and processes that cause emissions – working towards leaving fossil fuels in the ground, preserve the world’s forests and make renewable energy affordable to all (Green & Finighan, 2012, p. vii).

Australia is a major exporter of coal and gas and the governments and corporations involved in the trade are very strident in opposing any moves that would restrict those industries. A global approach to curtail the demand and include the exports as part of a country’s total emissions would be the only hope of restraining Australia. The adoption of solar energy has made major progress with cheaper and more efficient panels thanks to investments in Germany and China (Green & Finighan, 2012). The interest and use of renewable energy continues to grow and by 2011 it constituted 19% of global energy consumption with renewable energy contributing a rapidly rising share of energy supply in a number of countries (Sawin, 2013). This is an impressive development but there is a debate on whether traditional biomass, which contributed nearly half of this energy, is renewable and sustainable.

The large-scale conservation networks also provide grounds for optimism as a wide range of programs around the world are responding to the challenges of declining biodiversity and climate change in a variety of ways. Large scale is considered an important factor for ecological function and some operate across countries at continental or sub-continental scale (Fitzsimons, Pulsford, & Wescott, 2013a). This is clearly very challenging as there would be different local groups, interests and concerns as well as different national policies where borders are crossed. It is important too that the projects are overseen by someone or some organisation with a holistic view or ‘bigger picture’ to synthesise the different local initiatives (Lambert, 2013). The attractive aspect of connectivity conservation is that it connects protected and remnant vegetation areas as essential cores with other areas around and between them that have significant ecological value, to create a managed block of high ecological value (Fitzsimons et al., 2013a). In these areas native vegetation has a chance to thrive and where wildlife is concerned, animals can move freely. Examples include: the Cape Floristic Region of South Africa; the Bhutan and Terai Arc corridor of Nepal to save endangered tigers and rhinos; the Mesoamerican Biological Corridor covering seven

countries that helps to conserve the Great Green Macaw and; the Pan-European Ecological Network supported by over 50 countries that is helping to save the loss of biodiversity in Europe (Worboys & Mackey, 2013). Detailed case studies on connectivity corridors in Australia are provided by Fitzsimons et al. (2013b). The corridors management involves working with individuals and communities and is a sign of hope that people around the world are taking the care of their environment seriously.

Farming is an important part of the economies in Australia and New Zealand, as it is elsewhere, but when not properly managed it presents a major risk to biodiversity. Norton and Reid (2013) note that the prognosis for the native diversity in New Zealand and Australia appears grim if the current practises are not addressed. This is because in the past the transformation of natural ecosystems into farmlands included clearance of natural habitats leading to native biodiversity loss. The positive in the current situation is that increasing numbers of farmers are willing to consider biodiversity conservation as part of their farm management and there are good examples of this happening in Australia and New Zealand (Norton & Reid, 2013). The widespread participation in Landcare noted above is another sign of hope. A vision for a future where the loss of biodiversity is arrested and degraded lands reclaimed includes close cooperation and trust between farmers, conservationists and governments:

The key challenges to achieving this vision are to get farmers, conservationists, scientists and government talking and developing policy solutions together everywhere. Governments should assist agribusiness embrace market-based environmental accreditation schemes and commit to a progressive network of rural ecologists. (Norton & Reid, 2013, p. 266).

Farmers would cooperate when they can see the benefits and the valued role they can play. Small-scale farmers in Kenya were encouraged to see themselves as powerful people who could determine their destiny by planting trees so cooperating with one another and with the Green Belt Movement (Maathai, 2009; Mungai, 2012). While farming improperly poses the major risks in damaging the land, it also means farmers have a major stewardship role in protecting the land and conserving diversity.

CONCLUSION

Acknowledging that there is a problem is a vital step in finding a solution. Connectivity addresses the problem of having islands of conservation that exist as silos and suggests creating corridors for diversity conservation. Science helps to identify the local, regional, national or even international strategic roles different players could play to respond and manage the threat to diversity. Beyond that identification, activist groups, farmers, social scientists and policy makers have to join hands to implement those science-informed strategies.

Farmers have wrecked havoc in clearing land for agriculture but have also saved humanity from starvation. Now they also need to acknowledge the damage to diversity and the threat this poses to agriculture and the planet at large. The conservationists have also got to move away from viewing farmers as a problem and acknowledge the importance of partnership with them. Many farms still harbour pockets of native biota in Australia and New Zealand and have a vital role to play in saving it. The respective governments have to recognise these roles and set up a clear process of supporting farmers to play this vital role.

To address the problems of the loss of biodiversity has both science and social dimensions. It is therefore important to include the social studies into the environment and the environment studies into the social. Addressing the threat to biodiversity needs to have a multidisciplinary approach. While social workers focus on social problems resulting from the destruction of the environment or natural disasters they should also not overlook the relationship between environmental and social problems. Environmental justice and social justice are linked for as humans we stand to suffer when we destroy our environment and the poorest suffer the most. Social scientist also have a major role in the design and implementation of environment information and in mobilising people for action to save biodiversity, but they need to inform themselves first of the ecological science just as the scientists need to learn the social dimensions of their science.

ACKNOWLEDGEMENTS

The following colleagues have read the paper and offered helpful comments: Dr. Venkat Pulla, Ms. Jeanette Ninnis and Prof. Manohar Pawar.

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